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Class \_\_\_\_\_

Book \_\_\_\_\_









## TESTIMONIAL,

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FROM HIS EXCELLENCY, HORACE EATON, STATE SUPERIN-  
TENDENT:

I have examined in manuscript, a treatise of the Geography of Vermont, accompanied with maps, which is about to be published by Rev. Z. THOMPSON, for the use of common schools, and am prepared to give it my most full and hearty approval. It contains a great amount of information that should be accessible to every citizen and every child in the State.

In addition to the matter usually embraced under the head of Physical and Political Geography, a general account of the geology of the state, accompanied with such definitions and explanations in the science of geology generally, as will render a competent knowledge of the outlines of the geology of the state easily attainable by all the scholars in our common schools.

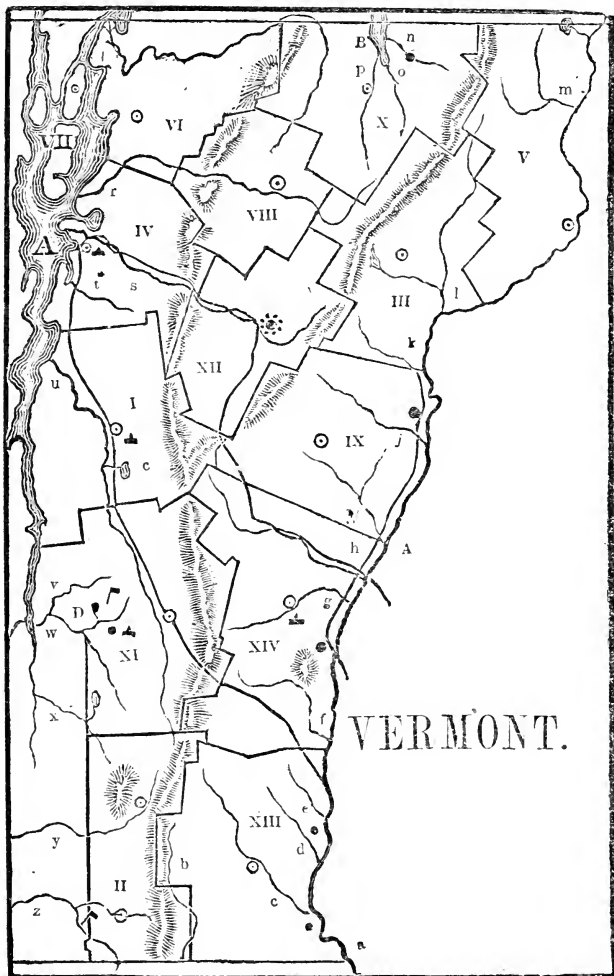
But the work will need no commendation with those who have seen and examined it; and no family in Vermont, that has once obtained it, will be afterwards willing to be without it.

HORACE EATON.

State Sup't. of Com. Schools.

Enosburgh, Sept. 8, 1843.





GEOGRAPHY AND GEOLOGY  
OF  
**V E R M O N T,**

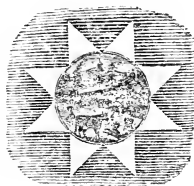
WITH  
STATE AND COUNTY OUTLINE MAPS.

FOR THE  
USE OF SCHOOLS AND FAMILIES.

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BY ZADOCK THOMPSON.

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Burlington:  
PUBLISHED BY THE AUTHOR,  
CHAUNCEY GOODRICH, PRINTER.

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1848

Entered according to act of Congress, in the year 1848, by  
ZADOCK THOMPSON,  
in the Clerk's office of the District Court, for the District of Vermont.

## PREFACE.

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The object of this little work, is to enable the youth of Vermont to acquire a competent knowledge of their own state. Most of the geographies used in our schools embrace so large a field that Vermont comes in for a very small share. The space in them usually allotted to a single state, affords room only for a few general facts, and the consequence is that, while they enable pupils to answer with promptitude, general questions relating to the geography of the world, they assist them very little in obtaining a knowledge of the individual state in which they reside.

To supply in part, at least, this deficiency within our own state, and to enable our young people to grow up in a knowledge of our own institutions, and of the objects and physical circumstances in the midst of which a kind Providence has placed them, is the design of this book. In the preparation of it, I have availed myself of the materials within my reach. I am well aware that deficiencies and errors will be found in it. But should it be thought worthy of an introduction into our schools, and another edition be demanded, I trust that superintendents and teachers of schools in the different sections of the state, will take sufficient interest in it, to induce them to furnish me with the means of supplying its deficiencies and correcting its errors; and with these improvements, it is my intention that there shall be a corresponding improvement in the mechanical execution of the book.

It may be proper perhaps, to say a few words respecting that part of the book which relates to geology. Geology has not hitherto been much studied in our schools; and yet it is, undoubtedly, one of the most useful departments of general geography. On account

of this neglect hitherto, I have devoted a very considerable proportion of the book to the geology of the state; and in the introduction, I have endeavored to give so much of elementary geology, and such definitions and explanations of geological terms as I thought necessary to enable persons unacquainted with the science, to understand what has been said on the subject in the body of the work. Believing that the technical terms of a science should be understood by all who would have a knowledge of the science, I have not sought to exclude them; but have endeavored to explain all those which are not found, and sufficiently defined, in our common dictionaries.

In preparing the synopsis of rocks on page 25, I had in view the formation of a small cabinet of specimens of our common rocks and minerals for the use of each school district. A cabinet consisting of from 60 to 100 specimens, neatly and correctly labelled and kept in the school room, to be employed in illustrating the lessons in this book, it is thought, would aid very much in making the lessons understood and remembered, and would create an interest in the sciences of geology and mineralogy, which would be enjoyed and manifested out of the school room. The expense of such a cabinet need not exceed \$5, should the districts generally see fit to procure them.

In teaching the descriptive geography the pupils should be required to draw, from memory, the outline maps, upon the blackboard, or upon their slates. Nothing else serves to imprint them so indelibly upon the mind. Upon their own neighborhoods they should be required to amplify, drawing their township upon a large scale, and locating the various hills, streams, villages &c., in accordance with their own observations, or with their knowledge, derived from other and more minute maps.

Some errors have been discovered which will, in due time, be corrected.

Burlington, Nov. 11, 1848.



# CONTENTS.

## INTRODUCTION.

I. General Definitions, . . . . .	13	V. Igneous Rocks, . . . . .	2
II. Forms of Matter, . . . . .	11	VI. Arrangement of rocks, . . . . .	22
III. Geological Elements, . . . . .	15	VII. Ages of Rocks, . . . . .	2
IV. Formation and Position of Rocks, . . . . .	18	VIII. Synopsis of Rocks, . . . . .	2

## PART I. PHYSICAL GEOGRAPHY.

### I. GENERAL FEATURES OF VERMONT.

1 Situation and Boundaries, . . . . .	27	4 Rivers and Streams, . . . . .	33
2 Extent and Area, . . . . .	28	5 Lakes and Ponds, . . . . .	39
3 Face of the country, . . . . .	28	6 Curiosities, . . . . .	41

### II. GEOLOGY AND MINERALOGY

1 Geological Map, . . . . .	41	2 Table Formations, . . . . .	45
-----------------------------	----	-------------------------------	----

#### I. QUATERNARY.

1 Soil, . . . . .	45	7 Shell Marl, . . . . .	50
2 Alluvium, . . . . .	46	8 Infusorial Silica, . . . . .	51
3 Pleistocene Sands and Clays, . . . . .	46	9 Clay Stones, . . . . .	52
4 Drift, . . . . .	47	10 Iron Ore, . . . . .	53
5 Drift Scratches, . . . . .	49	11 Pipe Clay, . . . . .	54
6 Muck, . . . . .	50		

#### II. SECONDARY.

Champlain Group.		Taconic Group.	
1 Red Sandrock, . . . . .	55	1 Taconic System, . . . . .	62
2 Hudson River Shales, . . . . .	58	2 Taconic Slate, . . . . .	64
3 Utica Slate, . . . . .	59	3 Sparry Limestone, . . . . .	64
4 Trenton Limestone, . . . . .	60	4 Magnesian Slate, . . . . .	64
5 Isle la Motte Limestone, . . . . .	61	5 Stockbridge Limestone, . . . . .	65
6 Calcareous Sandstone, . . . . .	62	6 Granular Quartz, . . . . .	65

#### III. PRIMARY.

Sec. 1. Talcose Slate Formation, . . . . .	67	Sec. 2. Calcareo-mica Slate, . . . . .	71
--	----	--	----

#### IV. IGNEOUS ROCKS.

1 Granite . . . . .	74	2 Greenstone, . . . . .	76	3 Porphyry, . . . . .	77
---------------------	----	-------------------------	----	-----------------------	----

## III. CLIMATE AND METEOROLOGY.

1 Preliminary Remarks, . . . . .	79	8 Anchor Ice, . . . . .	85
2 Temperature, . . . . .	79	9 Indian Summer, . . . . .	86
3 Winds, . . . . .	81	10 Smoky Atmosphere, . . . . .	86
4 Rain, . . . . .	81	11 Dark Days, . . . . .	86
5 Snow, . . . . .	83	12 Fireballs and Earthquakes, . . . . .	86
6 Seasons, . . . . .	83	13 Aurora Borealis . . . . .	87
7 Freezing of Lake Champlain, . . . . .	85	14 Variations of the Mag. Needle, . . . . .	87

## PART II.—POLITICAL GEOGRAPHY.

### Tabular View.—82.

#### I. ORIGIN OF THE GOVERNMENT.

1 Claims of Jurisdiction, . . . . .	90	6 Constitution, . . . . .	92
2 Township Grants, . . . . .	90	7 Vermont Charters, . . . . .	92
3 Towns, . . . . .	91	8 Origin of Political power, . . . . .	93
4 Councils of Safety, . . . . .	91	9 Town Officers, . . . . .	93
5 Vermont Independence, . . . . .	91	10 Freemen's Meeting, . . . . .	93

#### II. DEPARTMENTS OF GOVERNMENT.

1 Legislative Power, . . . . .	94	7 County Court, . . . . .	96
2 Senate, . . . . .	94	8 Justices of the Peace, . . . . .	97
3 House of Representatives, . . . . .	95	9 Probate Courts, . . . . .	97
4 Executive Power, . . . . .	96	10 Council of Censors, . . . . .	98
5 Judiciary Power, . . . . .	96	11 Laws and Punishment, . . . . .	98
6 Supreme Court, . . . . .	96	12 State Prison, . . . . .	100

## III. STATE INSTITUTIONS

1 State House, . . . . .	101	6 Revenue, . . . . .	104
2 Milnia, . . . . .	102	7 Salaries, . . . . .	104
3 Flag, . . . . .	102	8 Lotteries, . . . . .	105
4 Coat of Arms, . . . . .	103	9 Post Offices, . . . . .	106
5 Banks, . . . . .	103	10 Telegraph, . . . . .	105

## IV. THE PEOPLE AND THEIR EMPLOYMENTS.

1 Aborigines, . . . . .	107	5 Agriculture, . . . . .	111
2 Indian Relics, . . . . .	108	6 Manufactures, . . . . .	112
3 Hieroglyphics, . . . . .	110	7 Commerce, . . . . .	114
4 Population, . . . . .	110	8 Rail Roads, . . . . .	116

## V. PUBLIC INSTRUCTION,

1 Primary Schools, . . . . .	118	10 Congregationalists, . . . . .	127
2 Academies, . . . . .	121	11 Methodists, . . . . .	123
3 University of Vermont, . . . . .	122	12 Baptists, . . . . .	123
4 Middlebury College, . . . . .	123	13 Episcopalians, . . . . .	129
5 Norwich University, . . . . .	124	14 Freewill Baptists, . . . . .	129
6 Castleton Medical College, . . . . .	125	15 Christians, . . . . .	130
7 Vermont Medical College, . . . . .	125	16 Universalists, . . . . .	130
8 Printing, . . . . .	126	17 Roman Catholics, . . . . .	130
9 Religion, . . . . .	126	18 Unitarians, . . . . .	130

Character of the People, . . . . . 131

## PART III. GEOGRAPHY BY COUNTIES.

I Addison County, . . . . .	131	VIII Lamoille County, . . . . .	181
II Bennington County, . . . . .	142	IX Orange County, . . . . .	186
III Caledonia County, . . . . .	148	X Orleans County, . . . . .	192
IV Chittenden County, . . . . .	155	IX Rutland County, . . . . .	198
V Essex County, . . . . .	164	XII Washington County, . . . . .	203
IV Franklin County, . . . . .	168	XIII Windham County, . . . . .	209
VII Grand Isle County, . . . . .	177	XIV Windsor County, . . . . .	214

## KEY TO THE OUTLINE MAPS.

## COUNTIES.

I. Addison,	VI. Franklin,	XI. Rutland,
II. Bennington,	VII. Grand Isle,	XII. Washington,
III. Caledonia,	VIII. Lamoille,	XIII. Windham,
IV. Chittenden,	IX. Orange,	XIV. Windsor,
V. Essex,	X. Orleans,	

## MOUNTAINS.

M. Mansfield,	P. Killington Peak,	R. Ascutney,
N. Camel's Hump,	S. Sterling Peak,	T. Shrewsbury Peak.
O. Jay Peak,	Q. Equinox,	

## LAKES AND PONDS.

A. Lake Champlain,	D. Bombazine,	G. Salem Pond,
B. Memphremagog,	E. Willoughby,	H. Joe's Pond
C. Danmore,	F. Welis Pond,	

## RIVERS.

a. Connecticut,	j. Waits,	r. Winooski,
b. Deerfield,	k. Wells,	s. Laploitt,
c. West,	l. Passumpsic,	u. Otter Creek,
d. Saxtons,	m. Nullegan,	v. Hubbardton,
e. Willits,	n. Clyde,	w. Poultney,
f. Black W. Co.	o. Barton,	x. Pawlet,
g. Otta Quennee,	p. Black, O. Co.	. Battenkill,
h. And,	q. Missisco,	. Hoosic.
I. Ompompenoosuc	r. Camille,	



Capital.



County Seats.



Villages.



Colleges.



Battle Fields.

— Rail Roads.

# INTRODUCTION.

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## I. GENERAL DEFINITIONS.

1. The *earth* on which we live is round like a globe or ball.

2. Its *diameter* is about 8000 miles and its *circumference* about 25000 miles.

3. The *surface* of the earth consists of land and water.

4. More than two-thirds of the earth's surface is water and a little less than one-third land.

5. The principal sciences, which relate to the earth generally, are *geometry*, *geography* and *geology*.

6. Each of these terms is composed of the Greek word  $\gamma\eta$ , (*gē*), which signifies the *earth*, and another word in that language denoting the object of the science: thus,

7. *Geometry* is from  $\gamma\eta$  and  $\mu\epsilon\tau\rho\omicron\nu$ , (*metron*), measure because by it measurements of the earth were made.

8. *Geography* is from  $\gamma\eta$  and  $\gamma\rho\alpha\varphi\omega$ , (*grapho*) to write, signifying a description of the earth; and

9. *Geology* is from  $\gamma\eta$  and  $\lambda\omicron\gamma\omicron\varsigma$ , (*logos*) a discourse, signifying a discourse, or dissertation about the earth.

10. Geography is the most general of these terms and sometimes embraces both the others.

11. Geography is usually *divided* into mathematical, physical and political.

12. *Mathematical Geography* has for its object the determination of the size and form of the earth, and its relation to the sun, moon and other celestial bodies; and also the relative position of places on the earth's surface, and the construction of maps.

13. The *basis* of mathematical geography is geometry.

14. *Physical Geography* describes the features of the earth's surface, as consisting of land and water:—the extent and form of continents and islands;—the eleva-

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What is the form of the earth?—its diameter?—its circumference?—its surface? What part is land?—water? What sciences relate generally to the earth? Of what are their names composed?—geometry?—geography?—geology? Which is the most general term? How is geography divided? What is mathematical geography?—its basis? What is physical geography?

tion and direction of mountain chains;—the soil and climate, and the animal and vegetable productions.

This definition of physical geography embraces meteorology, geology, zoology and botany.

15. *Political Geography* relates to the earth as the abode of man. It has for its object the description of all that relates to the social and moral condition of mankind;—their government, laws, resources, religion, education and history.

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## II. FORMS OF MATTER.

16. Matter exists under three general forms, solid, liquid and aeriform, and these forms depend generally upon temperature.

17. Water, for example, below the temperature of 32 deg. of Fahrenheit's thermometer, is a solid in the form of ice;—above 32° and below 212° it is a liquid, and above 212° it is changed into steam and becomes aeriform.

18. *Fluids* are either liquids, or aeriform bodies.

19. *Liquids* are called *non-elastic fluids*, and *aeriform bodies*, are called *elastic fluids*.

20. Fluids, which are permanently elastic, are called *gases*. The three general forms of matter exist abundantly at the common temperature; the *land* being solid, the *water* liquid, and the *atmosphere* aeriform.

21. The matter which composes the earth and the objects upon it, is also distinguished into *organic* and *inorganic* matter.

22. *Organic matter* is that which has been affected, or modified by its connexion with life, or has constituted an organ, part, or appendage of a living being.

All terrestrial life, and hence all organic matter, is either animal or vegetable.

23. *Inorganic matter* is that which has not been modified by life, and is comprehended under the term *mineral*, taken in its most general sense.

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What does the definition of physical geography embrace? To what does political geography relate? What its object?

What are the general forms of matter? Upon what do they depend? What example? What are fluids? What fluids are non-elastic?—elastic? What on gases? In what do the three forms of matter exist abundantly? In what other way is matter distinguished? What is organic matter? What is inorganic matter?

21. *Mineralogy* is the science which treats of the nature, form and composition of minerals.

25. *Simple substances* are those which consist of only one kind of matter, and are more particularly the objects of *Chemistry*. They are 55 in number, and by their various combinations all known compound bodies are formed.

26. *Simple minerals* are either simple substances, or such compounds of simple substances, as are homogeneous in their qualities and aspect.

27. Minerals are *distinguished* by color, form, lustre, streak, hardness, specific gravity &c. and by chemical analysis.

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### III. GEOLOGICAL ELEMENTS.

28. *Geology* is the science which treats of the combination and position of the mineral masses, which compose the crust of the earth, and of the organic remains which they contain.

29. The *crust* of the earth is that exterior portion of the earth, which is exposed to human observation.

30. *Organic remains* are portions, or impressions of animal, or vegetable substances, embraced in mineral masses.

31. *Fossils* is another name for organic remains; so called because they are usually dug out of the earth.

32. The science which treats of fossils, or organic remains, is called *palæontology*.

33. Minerals are the *elements* of geology, all rocks being formed of minerals.

34. Nine of the minerals enter so largely into the composition of rocks, that they have been called the *geological alphabet*. These are quartz, feldspar, mica, talc, hornblende, argillite, carbonate of lime, gypsum and chlorite.

35. *Quartz* is the mineral commonly known in this state as *white flint*. Its usual color is white, though not always so; and, when crystalized, it resembles cut glass and is called *rock crystal*. It scratches glass and cannot

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What is mineralogy? What are simple substances?—how many? What is said of simple minerals? How are minerals distinguished? What is geology? What the crust of the earth? What are organic remains? What are fossils? What the science which treats of fossils? Of what are minerals the elements? How many constitute the geological alphabet? What their names? What is quartz?—its color?

be cut with a knife. Quartz constitutes nearly one half of the crust of the earth. The white stones, and white seams in the rocks, in the central and eastern parts of the state, are nearly all quartz.

Quartz is an essential constituent of glass. The sand used in making bricks and mortar, is quartz.

36. *Feldspar* has a pearly lustre, is not so hard as quartz, and is less glassy in its appearance. Its usual color is grayish white, though often found of other colors. It constitutes about one tenth of the earth's crust. Feldspar, decomposed, forms a white clay called *kaolin*, from which porcelain, stone ware and fire bricks are made.

37. *Mica* is always in shining elastic scales, and is often improperly called *isinglass*. Its more common colors are black, yellow and white, or silver colored. It constitutes about one twentieth of the earth's crust.

The large sheets of mica are used for lanterns, stove windows, &c. It is sometimes called Muscovy glass.

38. Granite and gneiss consist of quartz feldspar and mica blended together. They differ only in the latter being stratified and the former not. The color of these rocks usually depends upon the amount and color of the mica in them.

39. *Talc* often resembles mica, but may be distinguished from it by its being very much softer, by its unctious feel, and by its want of elasticity. If a scale of talc be bent, it remains bent after the force is removed, but if a scale of mica be bent, it springs back on the removal of the force. Its most common color is light green.

40. Steatite, or soapstone is principally talc, and talc enters largely into the composition of talcose slate, and from it they derive their oily feel.

41. *Hornblende* is one of the toughest of the earthly minerals. It has a confused fibrous structure and its color is usually greenish, brownish or black. It forms about one twentieth of the earth's crust, and is most common in volcanic countries. It is not so hard as quartz.

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What part of the earth's crust is quartz? What are some of its uses? What is said of feldspar? How much of the earth's crust is feldspar? What its use? What is said of mica?—its colors? What part of the earth's crust?—its use? Of what are granite and gneiss composed? How distinguished? On what depends their color? What is said of talc? How distinguished from mica?—its color? What is steatite? What is said of hornblende? How much of the earth's crust is hornblende?

42. *Argillite* is the common slate, which is used for roofing and for cyphering slates. It is too well known to need description.

43. *Carbonate of lime* constitutes all our common limestones and marbles. It is much softer than quartz and feldspar, and its colors vary through all shades of gray, blue and brown, from pure white to a perfect black. When crystalized it forms *calcareous spar*. The white seams in the black slates and limestones along the east side of Lake Champlain and on the islands, are calcareous spar.

Carbonate of lime becomes quicklime by burning, which expels the carbonic acid. It may be known by applying to it a drop of sulphuric, nitric or muriatic acid. If an effervescence takes place, it is carbonate of lime. Calcareous tufa and shell marl are carbonate of lime. Any limestone which will take a fine polish, is properly called *marble*. Limestone constitutes about one-seventh of the earth's crust.

44. *Gypsum*, called also *plaster of Paris*, is the sulphate of lime. It is softer than common limestones, and may be distinguished from them by not effervescing with acids. It is used as a manure, for stucco, and for making casts of various kinds. Crystalized, it forms the minerals called selenite and alabaster.

45. *Chlorite* resembles talc, but is a little harder, and has not the oily feel of talc. It is of a dark green color, and when breathed upon gives out the odor of clay. Magnified, it appears like a mass of green scales. The presence of chlorite in its composition, is what gives the green color and the name to *chlorite slate*.

46. All of the preceding nine minerals, excepting gypsum, enter more or less largely into the composition of the rocks of Vermont. No gypsum has yet been found in this State.

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What is argillite? What is said of carbonate of lime? Its hardness?—its colors? What is it called when crystalized? How made into quicklime? How known? What are tufa and marl? What is marble? How much of the earth's crust is limestone? What is gypsum? How known from limestone? For what used? What is said of chlorite? How many of the preceding nine minerals are found in Vt.?

## IV. FORMATION AND POSITION OF ROCKS.

47. The *water*, or liquid portion of the earth's surface, consists of oceans, seas, ponds, streams and springs.

48. The *land*, or solid portion of the earth's surface, or crust, consists of rocks, stones, sand, clay, marl and vegetable mould.

49. The term *rock*, as often used in geology, may embrace any, or all of the materials enumerated above, as forming the crust of the earth.

50. Rocks are divided into *two classes*, the stratified rocks, and the unstratified rocks.

51. *Stratified* rocks have their materials so arranged as to be divided by parallel planes, while the *unstratified* rocks are not thus divided.

52. That portion of a stratified rock, which lies between two of these parallel planes is called a *stratum*. When two or more of these are spoken of together, they are called *strata*, which is the plural of *stratum*.

53. When large wedge-shaped, or irregular masses, are interposed between strata, they are called *beds*. The strata themselves are sometimes called beds.

54. When strata of different kinds alternate with each other, they are said to be *interstratified*.

55. The two chief agents, in the formation of rocks, are *water* and *fire*.

56. The *stratified rocks* were originally, evidently, deposited from water, in the form of sand, clay, or marl, as we see those materials now deposited in ponds and lakes, and were afterwards consolidated by pressure and heat—the sand becoming sandstone; the clay, slate; and the marl, limestone. Hence the stratified rocks are also called *sedimentary rocks*, or *aqueous rocks*.

57. The *lowest* in the series of stratified rock must have been deposited *first*, and are therefore the *oldest* of the stratified rocks.

58. When the sedimentary materials, of which the stratified rocks are composed, were deposited, the strata must have been nearly horizontal. If they had remained in that position, only the upper stratum would have been exposed to view. But now, we find the strata with

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Of what does the liquid portion of the earth's surface consist? —the solid portion? How is the term rock used? How are rocks divided? What the distinction? What is said of stratum and strata? What are beds? What is meant by interstratified? What are chief agents in the formation of rocks? How are stratified rocks formed? What other names have they? Which of them were first deposited? In what position were they deposited?

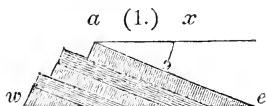


every degree of inclination, from the horizontal to the vertical. Hence the condition of those strata, which are not now nearly horizontal, must have been changed since they were formed. This may have been effected by the upheaval of one portion, or by the depression of another, or by both at the same time.

59. The pitch of the rocks, that is, the angle which the strata make with the plane of the horizon, is called their *dip*.

60. The *strike*, or line of bearing of the strata, is always at right angles to the direction of the dip.

*Illustration.*—If  $a e w$  be a section of stratified rock,  $e$  being east and  $w$  west, then the *dip* of the stratum  $a e$  will be east and the measure of the dip will be the arc  $x c$ , which in this case is about  $35^\circ$ . The *strike*, being at right angles with the direction of the dip, will be north and south.



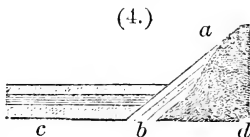
61. The line of strike, from which, or towards which, the strata on each side dip, is called an *axis*. If the strata dip from it, as at  $a$ , it is called an *anticlinal axis*, but if towards it, as at  $b$ , a *synclinal axis*. Fig. 2, 3.



62. If none of the stratified rocks had been disturbed, those in the same country would be very nearly parallel and conformable to one another. But this is not the case. We often find in the same country a part of the rocks with their strata nearly vertical, other portions less inclined to the horizon, and, perhaps, still others horizontal.



Now it is plain that the two formations represented in fig. 4, were deposited at very distinct periods— $a b$  being first formed, and afterwards thrown up, so that the strata made an angle



Is that their position now? What the inference? How effected? What is the dip of rocks?—the strike?—how illustrated? What is meant by axis?—anticlinal axis?—synclinal axis? Under what circumstances would all stratified rocks have been conformable? Are they so?

of about  $45^{\circ}$ . While in that position, the horizontal formation *c* was deposited. These formations are said to be *unconformable*, because the strata of one are not parallel to those of the others. It sometimes happens that there are, at the same place, several unconformable series of strata, which have been deposited at periods very remote from each other.

63. The absolute age, in years, of stratified rocks, cannot be determined, but their relative ages are clearly indicated by their position and order, the *oldest* rocks being those which lie lowest in the series, and becoming *newer* in proceeding upward to the highest, which is also *newest*.

64. High and low, as applied to rocks, by geologists, have not always the usual reference to the horizontal level. Rocks which are *lowest* in a geological sense, often constitute the highest summits of mountains, while the rocks which are *highest* in the same sense, occupy the vallies. Thus in fig. 4 *ab* is a lower formation, geologically, than *c*, though a portion of it is now higher in reference to the horizon.

65. The lowest stratified rocks rest upon rocks which are unstratified; that is, rocks which show no planes indicating deposition, but which split equally well in all directions.

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#### V. IGNEOUS ROCKS.

66. The *unstratified* rocks occur in irregular masses, often of vast extent, which have been forced outward from the interior of the earth, lifting up the stratified rocks, and frequently protruding through them, so as to form the summits of the loftiest mountains.

67. Granite, syenite, greenstone, hypersthene and porphyry, are unstratified rocks.

68. The unstratified rocks are more or less crystalline in their structure, and have evidently been melted, or in a state of fusion by heat. Hence they are called *plutonic*, or *igneous rocks*.

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How illustrated? Can we determine the age of rocks? How their relative ages? What is said of high and low? How is this subject illustrated? Upon what do the lowest stratified rocks rest? What is said of the unstratified rocks? Name the principal? By what general names are they called? Why?

69. The *igneous rocks*, which are exposed to observation, were not all formed at the same period, but are of different ages, some perhaps being older than any of the stratified rocks, but many of them much more recent, as is proved by their containing fragments of stratified rock in them, and by their forming dikes and veins in stratified rocks.

70. *Dikes* are seams crossing stratified rocks and filled with granite, greenstone, porphyry or some other unstratified substance.

(5)



*Dikes in Slate Rock.*

71. *Greenstone dikes*, called also *trap dikes*, are met with in many parts of Vermont, but are most numerous in Chittenden county. The exposed parts have a dark rusty hue, and they are often mistaken for veins of iron ore.

72. Several of the greenstone dikes are *amygdaloidal*, that is, they have other minerals embedded in them like almonds in cake.

72. *Porphyry dikes*, and other feldspar dikes, are numerous in the town of Shelburne and Charlotte in the south west part of Chittenden county. They vary in color from a light gray to a dark chockolate brown. They are mostly in the shales extending in some cases into the red sandrock formation. Many of them are of a light gray color without the embedded crystals, which distinguish porphyry.

74. Granite dikes, veins, seams and beds are very common in the northeastern part of Vermont. A most interesting locality of granite veins and seams may be seen in Marshfield near the foot of the Great Falls.

75. All the granite in Vermont has evidently been forced up from beneath, through the stratified rocks. In Woodbury the granite contains fragment of slate embedded in it.

76. The granite of Vermont is of different ages, the more recent often containing embedded fragments of that which is older.

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What is said of their ages? What are dikes? What is said of greenstone dikes? For what have they been mistaken? What is said of several of the greenstone dikes? What is said of the porphyry dikes?—their color? their situation? What is said of granite dikes, veins &c.? what locality is mentioned? what is said of the granite in Vermont?—its age?

77. The serpentine in Vermont is probably of igneous origin. Although it is thought to exhibit some signs of stratification, it appears evidently to have been melted.

78. The limestones, too, which are found in beds among the primary stratified rocks, are regarded as of igneous origin.

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## VI. GENERAL ARRANGEMENT OF ROCKS.

79. The general surface of the earth consists of soil, or that which forms the basis of vegetation. Next below this and above the solid rocks, are deposits of loam, sand, clay and gravel, frequently containing fossils, but such species, as are still found living upon the earth. The only solid rocks in this series, are *conglomerates*, consisting of sand, gravel, or pebbles, cemented together by carbonate of lime, alumina, or hydrate of iron. These several formations are often comprehended under the name of *post-tertiary* or *quaternary*.

80. Next below the quaternary are deposits of sands, clays, gravels, and conglomerates, in which are fossils of living and extinct species mingled together. To these formations geologists have given the general name of *tertiary*.

81. Below the tertiary we find an immense series of formations, consisting of chalk, sands, clays, oolites, coal, sandstones, slates and limestones. These contain, in many places, numerous remains of vegetables and animals, but all the species are now extinct.

82. These rocks have been differently divided by different geologists, some comprehending them all under the general name of *secondary*, subdividing them into upper and lower secondary, while others restrict the term secondary to the upper division, and give to the lower division the name of *transition* or *palæozoic* rocks. Palæozoic means ancient life, and they are so named because in these rocks are found the earliest signs of organic life.

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What is said of the serpentine in Vermont?—of the limestone? Of what does the general surface of the earth consist?—what next below? What is said of the fossils?—what name is given to these formations? What next below the quaternary? What name is given to these formations? What below the tertiary? What is said of the fossils? what name is given? How subdivided?

83. Below the secondary rocks we find a series of stratified rocks, consisting of limestones, quartz, slates or shales, and gneiss, in which no organic remains have been found. These being the first, of the existing stratified rocks, which were formed, have received the name of *primary rocks*.

84. These rocks, on account of their containing no remains of living beings, are sometimes called *azoic rocks*, that is, without life; and because their crystalline structure shows that they have been very much changed by heat since they were deposited, they are also called *metamorphic rocks*.

85. These rocks, when first formed, may have contained organic remains, which were dissipated and obliterated by the heat to which they were afterwards subjected. Many of the palæozoic rocks afford evidence that they have been very much affected and changed by heat.

86. Next below the primary strata lie the unstratified rocks.

87. The classes and principal subdivisions of the rock formations, and the thickness of several of these divisions, are exhibited in the following table:

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What below the secondary? What name is given them? Why are they sometimes called azoic? Why metamorphic? What is said of their having contained organic remains? What lie below the primary strata?

QUATERNARY CLASSES.		Systems.	Divisions.	Thick- ness.	Countries.
TERTIARY.	QUATERNARY.		Soil.	Feet.	
			Alluvium.		
			Newer Pleistocene		Southern States,
			Older Pleistocene.	200	Vt., Canada,
			Drift.	variable.	N. America and Europe.
	TERTIARY.		Newer Pleiocene. } Older Pleiocene. }	2000	England, Italy,
			Miocene.	500	France, Southern
			Eocene.	1000	States.
SECONDARY.	Secondary.	Carboniferous.	Chalk.	600	Western Europe and
			Greensand.	500	Southwestern U. States.
			Wealden.	900	England.
			Oolite.	1250	Western
			Lias.	1300	Europe.
	Carboniferous.	Polkiline.	New Red sandstone.	900	Connecticut, western Europe.
			Magnesian limestone.	300	
			Coal Measures.	300	Western States.
			Carboniferous Limestone.	3000	Virginia.
			Old Red Sandstone.	1000	Pennsylvania.
	Palaeozoic or Transition.	Upper Silurian.	Erie Group.	3500	N. Y. & Western States.
			Helderberg Group.	1800	N. Y. & Western States.
			Ontario Group.	1000	N. & Western States.
			Champlain Group.	2200	New York, Vt.
			Taconic Group.		Vt., Massachusetts.
PRIMARY.			Clay Slate. Talcose slate. Limestone. Hornblende slate. Mica slate. Gneiss. Quartz.	Several miles.	

The groups of palaeozoic rocks have different local names in different countries. The names here given are derived from our own neighborhood.

Unstratified Igneous Rocks.

## VII. AGES OF ROCKS.

88. The relative ages of rocks, as has been already stated, (63,) is determined in the first place by superposition.

89. By examining the fossils in the rocks of different ages, it has been found that there are various geological eras, which are readily distinguished by fossils peculiar to each; and hence the characteristic fossils have become the readiest means of determining the geological position and age of a formation.

90. There is, perhaps, no place on the earth where the whole series of formations, embraced in the table, is to be found together. But there are many places where a large number of them are exposed to view, and these have been so thoroughly studied and compared, by geologists, and the characteristic fossils of each formation are now so well known, that a single isolated formation containing fossils, can usually be referred, without difficulty, to its true place in the series.

## VIII. SYNOPSIS OF ROCKS.

91. The following is a list of rocks found in Vermont, and of the principal minerals and elements, which compose them.

1. GRANITE consists of quartz, feldspar and mica, and is unstratified. (34)

2. *Quartz* is nearly pure silica. (35)

3. *Feldspar* consists essentially of silica, alumina and potash.\* (36)

4. *Mica* consists of silica, alumina and iron. (37)

5. SYENITE consists of quartz, feldspar and hornblende, and is called syenitic granite.

6. *Hornblende* consists of silica, magnesia, lime, alumina and iron. (41)

7. GNEISS consists of the same materials as granite, but differs from it in being stratified.

\* Only the principal elements which enter into the composition of the different minerals are mentioned in this synopsis.

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How are the relative ages of rocks determined? How are fossils used for this purpose? Are all the series of rocks found at any one place? How is the age of a single isolated formation ascertained? What is said of granite?—of quartz? Feldspar? Mica? Syenite? Hornblende? Gneiss?

8. *Mica slate* or, *Mica Schist*, consists essentially of quartz and mica and is stratified.

9. *Talcose slate* consists of talc and quartz or feldspar, and sometimes has a high lustre.

10. *Talc* consists of silica and magnesia, and divides into thin laminae. (39)

11. *Steatite* consists of the same as talc, but it is more massive and usually of a gray color. Nos. 9, 10 and 11 have an oily feel. (40)

12. *Chlorite slate* consists of chlorite and quartz, and is of a greenish color

13. *Chlorite* consists of silica, alumina, magnesia and iron. (45)

14. *Magnesian slate* is a general name, embracing both the talcose and chlorite slates, because magnesia enters largely into their composition.

15. *Hornblende slate* consists of hornblende, quartz and feldspar, and is usually of a darker color and tougher than the preceding slates.

16. *Clay slate*, *Argillaceous slate*, or *Argillite* consists of quartz and alumina. (42)

17. *Clay* consists of quartz and alumina.

18. *Granular Quartz* consists almost entirely of grains of quartz, and is usually of a brownish yellow color.

**LIMESTONE** consists essentially of carbonic acid and lime. It sometimes contains a considerable proportion of quartz or magnesia. In the former case it is called siliceous limestone and in the latter magnesian limestone. (43)

20. *Calcareous Spar* is crystalized limestone.

21. *Serpentine* consists essentially of quartz and magnesia verry finely and closely compacted together. It is usually unstratified, is of a dark green color, often variegated, and, when free from seams, is a beautiful substitute for marble.

22. **GREENSTONE** consists of feldspar and hornblende. It is often called *trap*. It exists in Vermont only in dikes and when exposed to the weather, is of a dark rusty color. (71)

23. **PORPHYRY** consists almost wholly of feldspar, containing disseminated crystals of feldspar of a different color. (73)

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Mica slate ? talcose slate ? talc ? steatite ? chlorite slate ? magnesian slate ? hornblende slate ? clay slate ? clay ? greenstone quartz ? limestone ? calcareous spar ? serpentine ? greenstone ? porphyry ?



# STATE OF VERMONT.

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## PART FIRST.

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### PHYSICAL GEOGRAPHY.

#### I. GENERAL FEATURES OF VERMONT.

**SITUATION.** Vermont belongs to the northeastern division of the United States, and is the northwestern state in New-England. It lies between  $42^{\circ}44'$  and  $45^{\circ}$  of north latitude and between  $3^{\circ}35'$  and  $5^{\circ}29'$  of east longitude from the capitol of the United States at Washington. Addison is the most western, and Canaan the most eastern, township in the state.

**BOUNDARIES.** Vermont is bounded on the north by Canada, east by New-Hampshire, south by Massachusetts and west by New-York.

The north line was finally established by treaty, in 1842 on what had been regarded as the 45th parallel of latitude, and, in 1845, permanent monuments were erected upon it, at convenient distances from each other. The *true* 45th parallel lies a little to the southward of this line.

The eastern boundary is formed by the west bank of Connecticut river. The river belongs wholly to New-Hampshire. The western boundary passes along the deepest channel of Lake Champlain from the mouth of Poultney river. That part of this line south of Poultney river was surveyed in 1813 and 1814.

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To what division of the U. S. does Vt., belong? In what part? Between what latitude does it lie? Between what longitude? What is meant by latitude and longitude? Which is the most western township? the most eastern? How is it bounded? When and where was the north line finally established? Which way from this is the true 45th parallel? What is said of the eastern boundary?

**EXTENT AND AREA.** Vermont extends through  $2^{\circ}16'$  of latitude, and  $1^{\circ}54'$  of longitude, being  $157\frac{1}{2}$  miles long from north to south, and from 41 to 90 miles wide from east to west. The average width of the state is about  $57\frac{1}{2}$  miles. The whole area of the state is 9056 square miles, or 5,795,960 acres. This includes those parts of Lake Champlain and lake Memphremagog, which belong to Vermont. The land, embraced in the various grants within the state, amounts to about 8551 square miles, or 5,472,640 acres.

**FACE OF THE COUNTRY.**—The surface of Vermont is generally uneven, and its distinguishing feature is the range of mountains, which extends through the State from south to north, keeping nearly a middle course between Connecticut river on the east and Lake Champlain on the west. This range of mountains, being covered principally with spruce and other evergreens, was called by the French, who first explored this part of the country, *Verd Mont*, or the Green Mountain. And these French words were afterwards, by omitting the *d*, converted into *Vermont*, and adopted as the name of the state.

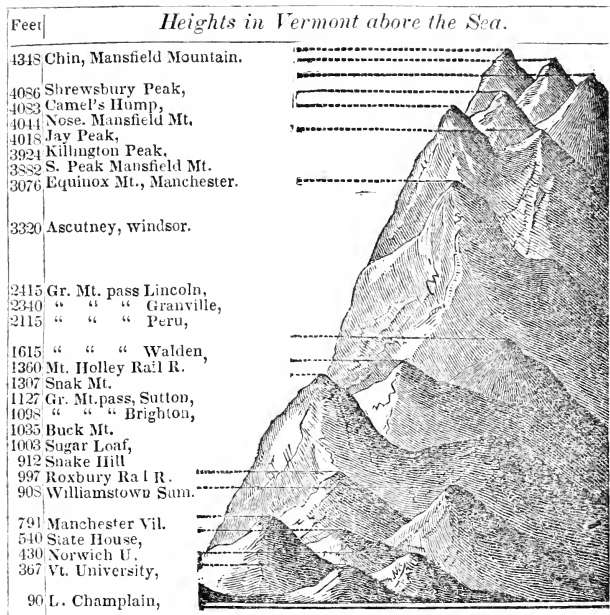
From the line of Massachusetts to the southern part of Washington county, the main ridge of the Green Mountains continues high and, comparatively, unbroken; while, further north, it is divided into sections by deep vallies, which allow the passage of rivers and convenient roads.

In the south part of Washington county and near the middle of the state, the Green Mountains send off a branch to the north east. This, in the north part of the state, divides the waters which fall into Connecticut river, from those which run into lake Champlain and

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How long is Vt. ? How wide ? What the average width ? How many square miles ? acres ? What does this embrace ? How much is land ? What is said of the surface generally ? What its distinguishing features ? What the timber on the mountain ? How did the name of Vermont originate ? What is said of the ridge of Gr. Mts. generally ? What branch do they send off ? What is it called ?

lake Memphremagog, and is usually called the *height of lands*. This range, though generally elevated, does not present any very lofty summits.



When the country was new, and the roads poor, the Green Mountains presented a very serious obstacle to the communication between the eastern and western parts of the state, and the phrase,—*going over the mountain*, denoted an arduous business. But on account of the great improvement of the roads in the past few years, and, especially, of their more judicious location near the streams, the difficulty of crossing the mountains has nearly vanished.

What is said of going over the the mountain in early times? How has the difficulty been removed? which is the highest mountain?—its height?

The western declivity of the range of Green Mountains is, in general, much steeper than the eastern, but the territory lying to the westward of these mountains is less broken and hilly than that to the eastward. The most level townships in the state are in the western part, in the neighborhood of Lake Champlain.

The most elevated summits in Vermont are Jay Peak in Jay, Sterling Peak in Sterling, Mansfield Mountains (Chin and Nose) in Mansfield, Camel's Hump in Duxbury, Killington Peak in Sherburn, Shrewsbury Peak in Shrewsbury, Ascutney in Windsor, and Equinox in Manchester. The height of these respectively may be learned from the foregoing diagram and table.

**RIVERS & STREAMS.** The rivers and streams in Vermont are very numerous, but none of them are large. Connecticut river runs along the whole length of the eastern boundary, but belongs to New-Hampshire, the line between New-Hampshire and Vermont, being the west bank of that stream. The greater part of the streams within the state, have their origin among the Green Mountains. All the streams on the east side of these mountains run easterly, or southeasterly, into the Connecticut river. Those on the west side run westerly into Hudson river, or Lake Champlain. A few streams in the north part of the state, run northerly into Canada or lake Memphremagog.

Winooski, Lamoille and Missisco rivers rise to the eastward of the highest range of Green Mountains and pass through that range into Lake Champlain. With the exception of these and Otter Creek, none of the streams in Vermont are navigable, and these are navigable for boats only a few miles from the lake. Steam-

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What is said of the declivities? Where are the most level townships? Which are the most elevated summits? What is said of the rivers and streams? What lies along the eastern boundary of Vt.? To what state does it belong? Where do most of the streams originate? What is said of the streams on the east side of the mountains?—on the west side?—of a few in the north part of the state?—of Winooski, Lamoille and Missisco rivers? Are any of the streams navigable?

boats ascend Otter Creek as far as Vergennes, which is about seven miles from the lake.

The streams, having their origin in the mountains, are mostly short and rapid, and falls, cataracts or cascades, are very common. These, in the large streams, furnish an abundance of water power for mills and machinery of various kinds, in most parts of the state. Saw mills, gristmills and carding machines are in operation in all parts, and in many parts, woolen factories, cotton factories and mills for other purposes are established. Most of the modern villages, that have sprung up, have arisen around falls, which afford sufficient water power for the establishment of mills and factories.

*Connecticut River*(a)—flows along the east side of Vermont, but belongs wholly to New-Hampshire. Its name is derived from two Indian words, which signify the long river. It rises in the north part of New-Hampshire, and running between that state and Vermont, and through Massachusetts and Connecticut falls into Long-Island Sound. The breadth of this river, adjacent to Vermont, varies from 150 feet to 450 feet. Its navigation is impeded by several falls and rapids. Bellows falls, OttaQuechee falls, McIndoes falls and the 15 mile falls are the most considerable. By the aid of locks around a few of these falls boats are enabled to ascend the river as far as Barnet. The first bridge over Connecticut river was built at Bellows falls in 1785, the second at Windsor in 1796. There are now about 20 bridges over this stream adjacent to Vermont.

#### RIVERS WHICH DISCHARGE INTO THE CONNECTICUT.

The rivers which discharge into the Connecticut are twelve in number, Deerfield, West, Saxton's, Williams,

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What are common in the streams? What do these furnish? What mills in all parts? Where are most of the modern villages? Where is the source of the Connecticut river? What its breadth? What is said of its magnitude? What are the principal falls? How has the navigation been improved? When and where was the first bridge over it? How many bridges now? How many and which rivers discharge into the Connecticut?

Black, Otta Quechee, Ompomponoosuc, Wait's, Well's, Passumpsic, and Nulhegan.

*Deerfield river (b)*—rises in Stratton and runs nearly south, about 24 miles, into Massachusetts. It then runs south east about the same distance and falls into Connecticut river between Greenfield and Deerfield. It receives the waters from about 320 square miles in Vermont.

*Wantasticook, or West River (c)*—has its source in Weston and Peru, and runs south-easterly into Connecticut river at Brattleborough. It is about 40 miles long and drains about 440 square miles. The main stream furnishes but few good mill privileges, but they are numerous on its branches.

*Saxton's River (d)*—is formed in Grafton, and, running easterly through the south part of Rockingham, falls into the Connecticut in Westminster. Length about 12 miles. It derives its name from a Mr. Saxton, who unluckily fell into it while engaged, at an early period, in surveying the line between Rockingham and Westminster.

*Williams' River (e)*—is formed in Chester by the union of three considerable branches, and running south-east 15 miles, falls into the Connecticut in Rockingham, three miles above Bellows Falls. This river takes its name from the Rev. John Williams, who was taken by the Indians at Deerfield, Massachusetts, in 1704. He is said to have preached a sermon here to his fellow prisoners, while on their way to Canada, there being, at that time, no civilized inhabitants within the present territory of Vermont.

*Black River (f)*—in Windsor county, rises in Plymouth, runs nearly south about 12 miles, then east 11

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Describe Deerfield river? How many square miles of Vt. is watered by it? Where does West river rise?—how long?—how much does it drain?—its mill privileges? Describe Saxton's river?—whence its name? What is said of Williams' river?—of its name? Describe Black river?

miles, and then south-east 12 miles, and falls into the Connecticut in the lower part of Springfield. It is remarkable for the great number of natural ponds through which it passes, for its numerous and excellent mill privileges, and for the dark color of its waters. It drains the water from about 160 square miles.

*Ottá Quechee River (g)*—originates in Sherburne, and, running nearly east through Bridgewater, Woodstock, and Hartford, falls into the Connecticut in Hartland. It has some very good mill privileges. It is 35 miles long, and waters about 212 square miles. The name of this stream is of Indian origin, but its meaning is not known.

*White River (h)*—rises in Granville, runs south-east to Stockbridge, then nearly east to Sharon, and then south-east into the Connecticut at Hartford. It receives three large branches from the north, called the 1st branch, 2d branch and 3d branch. It receives the 1st and 2d in Royalton, and the 3d in Bethel. White river furnishes but few good mill privileges. It is 55 miles long, and drains the waters from 680 square miles. This stream was known by the name of White river long before the country, in its neighborhood, was settled, and the name is supposed to have been given it, by the early hunters, on account of the clearness of its waters and the light color of its pebbles.

*Ompomponoosuc River (i)*—rises in Vershire, runs south-east through the corner of West Fairlee and through Thetford, and enters the Connecticut in Norwich. In Thetford it receives the waters of Fairlee lake. It is about 20 miles long and affords a number of good mill privileges. It waters 127 square miles.

*Wait's River (j)*—rises in Harris' Gore and runs south-

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For what is it remarkable?—how much does it water?—what its length? What is said of Otta Quechee river?—its length?—its name? Describe White river?—its branches?—its mill privileges?—what its length?—how much area drained by it?—what is said of its name? Describe Ompomponoosuc river?—what area does it water? What is said of Wait's river?

east through Orange, Topsham, and Corinth, and joins the Connecticut in Bradford. Its principal branches are North branch, South branch, and Jail branch. It is 20 miles long and furnishes several good mill privileges. It derives its name from Capt. Wait, belonging to Maj. Rogers' Rangers. It drains the waters from 106 square miles.

*Wells' River (k)*—originates in Kettle pond in Groton, runs through Long pond and the corner of Ryegate, and falls into the Connecticut in the north-east corner of Newbury. It is 18 miles long, and affords some good mill privileges, particularly at Wells river village near its mouth. It waters 87 square miles.

*Passumpsic River (l)*—has its origin in a pond in Westmore, and, running very nearly south 34 miles, falls into Connecticut river in Barnet. Its two principal branches are *Moose River*, which rises in East Haven and joins it at St. Johnsbury, and *Joe's Brook*, which originates in Cole's pond in Walden, passes thro' Joe's pond in Cabot and Danville, and falls into the Passumpsic in Barnet. About 445 square miles are drained by this river, a large proportion of which is excellent land. The name is said to be derived from the Indian phrase, *Bas-soom-suc*, signifying the stream where there is much medicine.

*Nulhegan River (m)*—is formed by two branches, one of which rises in Averill and the other in Avery's gore. They unite in Bloomfield, and after running a few miles, fall into the Connecticut near the south-east corner of that town. This river drains the waters from 120 square miles, and is about three rods wide at its mouth.

#### *Rivers which flow into Memphremagog Lake.*

The rivers which empty into Memphremagog lake are three, Clyde, Barton and Black river.

It s branches?—its length?—its name? Describe Wells river?—what area does it water? Where does Passumpsic river rise?—what its course?—its length?—its two principal branches?—how much area drained by it?—what is said of its name? What is said of Nulhegan river?—how Much territory is drained by it? How many and which rivers empty into memphremagog lake?



*Clyde River (n)*—has its source in Pitkin's and Knowlton's ponds in Brighton, runs north-west through Charleston and Salem, and falls into Memphremagog lake in Derby. With the exception of three miles of rapids near its mouth, this is a very sluggish stream, passing through, in its course, several natural ponds of considerable size. The rapids and falls, near its mouth, furnish several very commodious mill seats. The length of this stream is about 25 miles, and it drains the water from about 146 square miles.

*Barton River (o)*—originates in the fountains of *Run-away* pond on the north line of Greensborough, runs northerly through Glover, Barton and the corner of Irasburgh, and falls into Memphremagog lake in Coventry. In Barton it receives the waters of Barton pond, called also Belle Pond, or Crystal lake, and near the line of Irasburgh, the waters of Willoughby river, from a pond of the same name in Westmore. It is about 20 miles in length and waters about 160 square miles.

*Black River (p)*—in Orleans county, is formed in Craftsbury, by the streams which issue from Elligo and Hosmer ponds, and, running north-east through Albany, Irasburgh, and Coventry, falls into Memphremagog lake in Newport. It is a sluggish stream, 30 miles long, and waters about 150 square miles.

*Rivers which flow into Lake Champlain.*

The rivers which empty into lake Champlain are eight, Missisco, Lamoille, Winooski, Laplott, Otter Creek, Hubbardton, Poultney and Pawlet.

*Missisco River (q)*—is formed in Lowell, in Orleans county, runs north-easterly into Canada, thence south-westerly into Franklin county, and thence west and

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Where has Clyde river its source?—what is said of it?—its length?—how much does it drain? Where does Barton river rise?—what does it receive in its course?—what its length?—how much area does it water? Where is Black river formed?—what is said of it? How many and what are the rivers which empty into lake Champlain? Where is Missisco river formed?

north-west into Missisco bay. It is 75 miles long, and drains 580 square miles. It is navigable 6 miles from the lake, to Swanton falls. The falls in this river afford many excellent sites for mills, particularly the falls at Swanton and Highgate. *Missisco* is an Indian name, and is said, by some, to signify *much grass*, and, by others, *many water-fowl*, and has been spelled in print no less than twenty different ways.\*

*Lamoille River* (*r*)—formerly had its origin in a pond on the line between Glover and Greensborough, called Long pond. On the 6th of June, 1810, some persons cut a channel for the purpose of drawing off a part of the water towards the north, to give a greater supply to some mills on Barton river. The bank proved to be mostly a quicksand, and when the water commenced running, it almost instantly opened a channel by which all the waters of the pond were discharged in a few moments, notwithstanding it was more than 100 feet deep. The place where the pond *was*, is now called *Runaway pond*, and is overgrown with grass and young trees. The road from Derby to Montpelier passes through it. Lamoille river is now formed in Greensborough, and, running nearly west 70 miles, falls into lake Champlain in Colchester. There are falls in this stream which afford good sites for mills, in most of the towns through which it passes. It receives Wild branch in Wolcott and Brown's river in Fairfax, the former rising in Eden and the latter in Underhill. From the number of gulls seen about the mouth of this river, the French, who first discovered it, called it the *riviere la mouette*. In Charlevoix's map of the country, the engra-

\* See Thompson's Vt., part iii, p. 117.

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What its course?—its length?—how many square miles does it drain?—how far navigable?—what is said of its falls?—its name? Where did Lamoille river have its origin?—what happened to this pond?—what is the place called where it was situated?—what passes through it?—where is this river now formed?—what its length?—where does it empty?—what branches are mentioned?—how did its name originate?

ver omitted to cross the *ts* in *lamouette*, making it *lamouelle*, which afterwards became *Lamoille*, a very euphonious name.

*Winooski River*, (*s*) or Onion River,—rises in Cabot, runs south-westerly to Montpelier, and thence north-westerly, and falls into lake Champlain between Burlington and Colchester. The principal tributaries to this river on the south side are Stevens' branch and Dog river in Berlin, Mad river in Moretown and Huntington river in Richmond, and on the north side, North branch in Montpelier and Waterbury river in Waterbury. There are several remarkable chasms cut through the rocks by this river, particularly in Middlesex, Waterbury and at the High Bridge between Burlington and Colchester. The water power furnished by this stream is abundant, and, passing, for 40 miles, along the line of the Vermont Central railroad, it will doubtless soon be extensively used for manufacturing purposes. Winooski river is 70 miles long and carries off the waters from 970 square miles. The name, *Winooski*, is composed of two Indian words, *winoos*, leeks, or wild onions, and *ki*, land, signifying the land which produces wild onions; so that *Onion*, the name by which this stream has been generally known, is merely a translation of a part of the Indian name.

*Laplot River* (*t*)—rises in Hinesburgh and runs north-west into Shelburne bay. It is 15 miles long. There is a tradition that this river derives its name from a plot by which the whites destroyed a party of hostile Indians here in early times, but it is probably without much foundation.

*Otter Creek* (*u*)—is formed in Dorset, within a few rods of the Battenkill, and running a little west of north

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Where does Winooski river rise?—what its course?—where discharge?—what are its principal tributaries?—what is said of its chasms?—its water power?—what distance does the Central rail-road pass along this stream?—what the length of this river?—how many square miles does it water?—from what has it its name? Describe Laplot river—what is said of its name? Where is Otter creek formed?

falls into lake Champlain in Ferrisburgh. It is navigable as far up as Vergennes, 7 miles from its mouth. At Vergennes, Weybridge, Middlebury and Rutland are falls, which afford an abundance of available water power. Its principal branches on the east side are New-Haven river in New-Haven, Middlebury river in Middlebury, Leicester river in Leicester, Furnace brook in Pittsford, East creek in Rutland and Cold river and Mill river in Clarendon; and on the west side, Dead creek in Ferrisburgh, Lemonfair river in Weybridge, and Little West river in Rutland. It is 90 miles long, being the longest stream in the state, and waters 900 square miles. It was named by the French the river of *otters*, on account of the great number of otters inhabiting it in early times.

*Hubbardton River (v)*—is a small stream, which rises in Sudbury, and, after running south-west about 20 miles, falls into Poultney river in West-Haven.

*Poultney River (w)*—rises in Tinmouth, and in Fair Haven is joined by Castleton river, which rises in Pittsford. Poultney river forms the boundary of the state along the south line of Fair-Haven and West-Haven, and falls into lake Champlain near Whitehall. This river and its tributaries water 250 square miles.

*Pawlet River (x)*—rises in Dorset. In Pawlet it receives the waters of Wells' pond, and, running north-west, enters Wood creek in the state of New York a short distance before its junction with lake Champlain at Whitehall.

### *Rivers which flow into the Hudson River.*

The rivers in Vermont, which discharge their waters into Hudson river, are the Battenkill and Hoosic.

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What its course?—where empty?—is it navigable?—where are falls?—what its principal branches on the east side?—on the west side?—what its length?—what area does it water?—what is meant by area?—what is said of its name? Describe Hubbardton river. Where does Poultney river rise?—what river joins it?—how many square miles does it water? What is said of Pawlet river? What rivers from Vermont empty into Hudson river?

*Battenkill* (y)—is formed in Dorset, and runs a north-westerly course into Hudson river in the state of New York. It waters, in Vermont, about 225 square miles.

*Hoosic River* (z)—is formed in Pownal, and after running a few miles north-westerly into the state of New York, receives the waters of the Walloomscoik from Shaftsbury and Bennington, and then taking a south-western course falls into the Hudson a little below Stillwater. The *Walloomscoik* is formed in Woodford. On the banks of this stream, near the west line of Bennington, was fought the celebrated Bennington Battle. These streams water 180 square miles in Vermont.

The letters in the parentheses, after the names of the rivers, refer to the maps. The number of rivers here described is 26, just equal to the number of letters in the alphabet. Only 25 of them, however, belong to Vermont.

**LAKES AND RIVERS.** There are no large bodies of water which lie wholly in Vermont. More than half of lake Champlain, which lies along its western border, belongs to this state; and also about one-third of lake Memphremagog, which lies on its northern boundary. Those smaller bodies of water, which lie within the state, deserve only the name of ponds, although several of them are called lakes. Most of these ponds and small lakes will be described in the account of the counties in which they are situated.

*Lake Champlain*, (A)—reckoning from Whitehall to St. Johns in a right line, is 126 miles long from south to north. Its width from east to west is very unequal, varying from one-fourth of a mile to about 12 miles. Its average width is about  $4\frac{1}{2}$  miles, and it covers an area

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What is said of Battenkill? Where is Hoosic river formed?—which way does it run?—what stream does it receive? What is said of the Walloomscoik?—what happened on the banks of this stream?—how much of Vermont is watered by these streams? To what do the letters in parentheses refer?—how many rivers are described?—do they all belong to Vermont? Are there any large bodies of water in Vermont?—how much of lake Champlain?—of lake Memphremagog?—what name do other bodies of water deserve? What is the length of lake Champlain?—its width?—average width?—area?

of about 567 square miles, two-thirds of which belong to Vermont. This lake receives the waters drained from 4100 square miles of the territory of Vermont, which is very nearly one-half of the state. Its depth is, for the most part, sufficient for the navigation of the largest steam-boats, sloops, &c. It contains numerous islands, most of which belong to Vermont; and several of these islands are sufficiently large to constitute townships.

This lake was discovered in 1609, by Samuel Champlain, who gave to it his own name—Champlain. It has been said that Champlain was drowned in the waters of this lake; but this is incorrect. He died of disease at Quebec, in 1635.

The name, by which this lake was known to the Abenaki Indians, was *Peta-wâ-bouque*, signifying alternate land and water, in allusion to the numerous islands and points of land. The Iroquois Indians called it *Cania-deri-Guarunte*, or the door of the country, on account of its being the channel of communication between the Six Nations and the tribes of Indians along the river St. Lawrence.

This lake discharges, through the river Sorel, or Richelieu, into the St. Lawrence in Canada.

*Memphremagog Lake* (B)—is about 30 miles long from south to north, with an average width of nearly two miles. Only about one-third of this lake lies in Vermont; the other two-thirds in Canada. The interior position of this lake has hitherto prevented its being much used for purposes of navigation. It is crossed by a horse ferry-boat at Georgeville in Canada, and there are upon it some other small boats. This lake re-

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From how much territory in Vermont does this lake receive the waters?—what part of the whole state?—what is said of its depth?—its islands?—when and by whom discovered and named?—was he drowned in it?—what was it called by the Abenaki Indians?—what does it signify?—what did the Iroquois Indians call it?—why?—which way does it discharge? What the length and width of Memphremagog lake?—how much of it in Vermont?—is it much used for purposes of navigation?

receives the waters of the Clyde, Barton and Black rivers in Vermont, and discharges its waters through what is called Magog Outlet, into the river St. Francis at Sherbrooke, and through the St. Francis into lake St. Peter, an expansion of the St. Lawrence.

**CURIOSITIES.** These consist of waterfalls, chasms, caves &c.

**Falls.** These are very numerous, but, the streams in which they abound, being all small, they cannot vie in sublimity with the cataracts of large rivers. The falls in Missisco river at Troy and Highgate, in the Lamoille, at Milton, in the Winooski at Marshfield and Burlington, in Otter Creek at Vergennes and Rutland, and in Black river at Springfield, are among the most interesting. These will be mentioned more particularly hereafter.

**Chasms.** In many places in Vermont the streams have worn down channels in the rocks to the depth of 60 or 80 feet, and sometimes for a distance of half a mile. The most interesting chasms of this kind have been excavated by Black river at Cavendish and Springfield, by Winooski river at Middlesex, Waterbury and Burlington, and by Lamoille river at Highgate. At Waterbury the undermined rocks have fallen across the river, forming a *natural bridge* when the water is low.

**Pot-Holes.** These are circular holes worn in the rocks which form the beds of streams where there are falls or rapids. They are worn by stones and pebbles which are kept in a circular motion by the current of the stream. These holes usually vary from six inches to two or three feet in diameter, and are often from six to ten feet deep. They are sometimes met with at a considerable distance from any running water. One such

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What rivers does it receive from Vermont?—which way does it discharge? Of what do these curiosities consist? What is said of the falls? Which are referred to? What is said of chasms? What chasms are mentioned? What are potholes? How formed? What their size?

in Westford near a person's house, and at considerable distance from Brown's river and many feet above it, is used as a cistern for holding rain water.

The stones, by which the holes are worn, are themselves, for the most part, reduced to powder and washed away by the current; but they are succeeded by others by which the process is continued; and it is common to find in the bottom of these holes, stones which have been worn into a globular form. One of the most remarkable of these was found, while excavating for the railroad, in Hartford. It was in a pot-hole about 12 feet deep. It is a mass of very compact mica slate, which has been rounded into an almost perfect sphere, measuring two and a half feet in diameter, and weighing half a ton. By the generosity of the Hon. Charles Paine of Northfield, it has been deposited in the University of Vermont.

*Caves.* Caves are often met with in the limestone regions in this state, but they are not generally of very great extent. The most extensive which have been explored are in Dorset. A very remarkable one is said to exist in Danby. One in Clarendon consists of two rooms, one 20 and the other 30 feet long. The caves in Plymouth are among the most interesting in the state. The principal cave extends in one direction 100 feet and consists of seven different rooms. When first explored by the author of the work, in 1818, the rooms were richly ornamented with stalactites hanging like icicles from the rocks, some of which were hollow and nearly transparent, but they have long since been carried off by visitants.

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Where sometimes found? What one is mentioned? What the form of the stones found in them? What is said of that found in Hartford? What is said of caves?—of the caves in Dorset? Danby? Clarendon? Plymouth? When were the Plymouth caves first explored? What did they then contain?



*Stalactites* are carbonate of lime which is deposited from water as it evaporates, or slowly drops, from the underside of rocks in caverns. The deposit of carbonate of lime formed at the bottom of the cave where the drops fall, is called a *stalagmite*.

Several curiosities of different kinds will be mentioned in the articles on the geology of the state.

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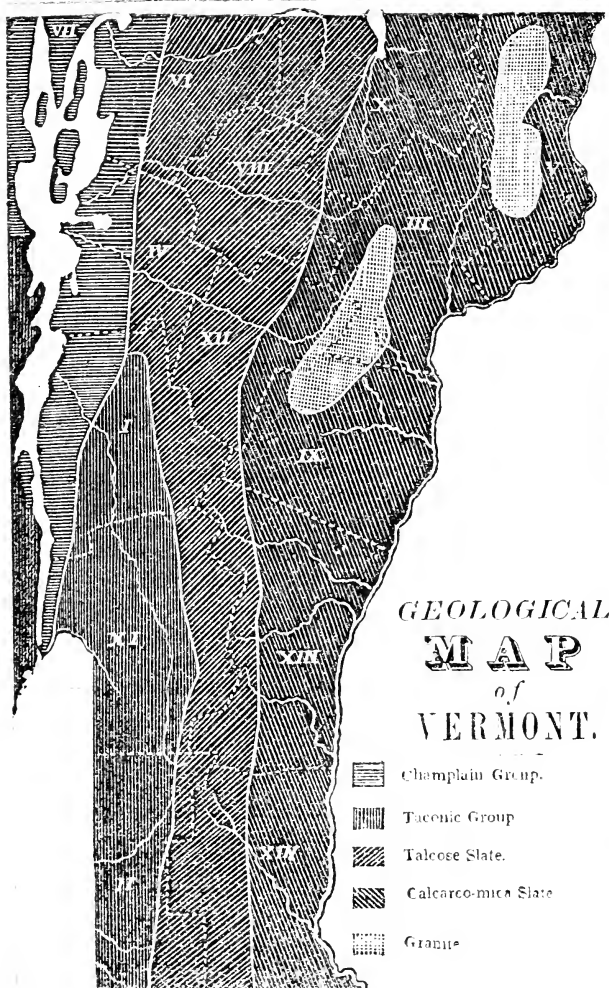
## II. GEOLOGY AND MINERALOGY.

All the geological formations in Vermont belong either to a very recent, or a very remote, geological era. In the general series of formations, exhibited in the table on page 24 of the introduction, all are entirely wanting in Vermont between the quaternary drift, and the Champlain group of the lower silurian rocks.

Now a knowledge of this simple fact is of very great practical value. Coal has never been found in workable quantities, except in that group of rocks lying between the new red and old red sandstone, called the carboniferous series. This series is entirely wanting in Vermont, and therefore there is nothing in our geological formations to warrant the expenditure of a single dollar in search of coal. The same remark will apply to salt, that article never having been obtained from any of the geological formations found in Vermont.

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How are stalactites formed?—stalagmite? What is said of the geological formations in Vermont? What formations are entirely wanting? Why is a knowledge of this fact valuable? What is the group of rocks called in which coal is found? Between what does it lie? What is said of salt?



With our present knowledge of the geology of Vermont, (the geological survey of the state not being yet completed,) the formations may be considered under the following divisions:

- |  |                                      |   |
|--|--------------------------------------|---|
| I. QUATERNARY. Superficial Deposits,   |                                      | { Soil.<br>Alluvium.<br>Pleistocene, Sand and Clay.<br>Drift.   |
| II. SECONDARY.                         | { Champlain group                    | { Red Sand Rock.<br>Hudson River Shales.<br>Utica Slate.<br>Trenton Limestone.<br>Isle la Motte Limestone.<br>Calcareous Sandstone. |
|  | { Lower Silurian.<br>Taconic system, | { Roofing Slate.<br>Taconic Slate.<br>Sperry Limestone.<br>Magnesian Slates.<br>Stockbridge Limestone.<br>Granular Quartz.          |
| III. PRIMARY SYSTEM. Azoic Rocks,      |                                      | { Clay Slate.<br>Calcareo-mica Slate.<br>Mica Slate.<br>Talcose Slate.<br>Gneiss.   |
| IV. UNSTRATIFIED ROCKS. Igneous Rocks, |                                      | { Granite.<br>Greenstone.<br>Porphyry.  |

#### I. QUATERNARY IN VERMONT.

1. *Soil* is that outward portion of the earth's crust which supports vegetation. Its principal constituents are sand, clay, lime and vegetable mould. The three first are produced by the disintegration of rocks, composed of those several materials; and hence the quality of soils depends much upon the nature of the rocks of the neighborhood. The best soils are found where

What does the quaternary in Vermont embrace? What groups of Silurian rocks have we? What are the members of the Champlain group?—of the Taconic? What are the members of the primary system? What other name have the primary? Why? What are our igneous rocks? What is soil?—of what does it consist?—how are the three first produced?—where are soils best?

there is a due mixture of these three ingredients. Too great a proportion of sand renders a soil dry, light and sterile, and too much clay makes it wet, heavy and stiff.

2. *Alluvium* consists of materials which have been washed down by water. The flats along the margins of our rivers and streams, called meadows or intervals, are made up of alluvium; that is, of sand, clay, gravel, and vegetable matter, which has been washed down from the higher lands and deposited in low places along the streams.

3. *Pleistocene Sands and Clays* are regularly stratified deposits of sand and clay along the eastern shore of lake Champlain and, extending, in many places, several miles from the lake. The thickness of this formation is, in some parts, about 200 feet, and the highest points of it are about 300 feet above the present level of the lake. In Addison county, and in the southern part of Chittenden county, the clay predominates in this formation; while in the northern part of Chittenden county, and in Franklin county, the sand is most abundant, particularly at the surface.

At the surface and at various depths in this formation, are found large numbers of marine fossil shells. These are found embedded in the strata in the position in which they lived and died, with the two valves united and the epidermis entire; and all are such as cannot live in fresh water, and, some of them, such as are found only between high and low water mark on the sea shore; and, moreover, they are the same kinds which are now most common on the sea coast of New England.

Hence it is certain that these sands and clays were deposited from salt water at a very recent geological period, and that an arm of the ocean then occupied the

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What effect has too much sand?—too much clay? From what is vegetable mould derived? What is alluvium?—what examples are given? What are pleistocene sands and clays?—what their thickness?—how high above the lake?—where does clay predominate?—where sand?—what are found in this formation?—what is said of them?—what does this prove?

present valley of lake Champlain and the whole St. Lawrence valley as far westward as lake Erie. At that time all the land in the valley of lake Champlain, which is not now more than 300 feet above the lake, must have been as low as the level of the ocean; and it has since been elevated about 400 feet above that level; in consequence of which the salt water was discharged and its place supplied, in part only, by the fresh water of the lake.

The fossils most common in this formation, are the following:

*Sanguinolaria fusca* (Tellina grœnlandica.) This species is very abundant in the banks, at places along the shore of the lake, and some localities have been observed several miles inland from the lake shore, and about 200 feet above it.

*Saxicava rugosa.* This species is quite common, but not so abundant as the preceding. This shell being thick and strong, is often found in a very good state of preservation.

*Mya arenaria* is the largest of the shells found here. They are less common than the preceding, but on some of the islands in the northern part of the lake, the number of individuals is very great, and they are often well preserved.

*Nucula portlandica* is found in the blue clay, but is not very common.

*Note.*—For figures of the two first, see Chittenden county.

*Drift.* Over almost the whole territory of Vermont, resting upon the solid rocks and beneath the soil, alluvium and pleistocene sand and clay, we find a deposit of stones, pebbles, gravel, sand and clay, very irregularly blended together, and with scarcely any signs of stratification. At some points, one of the above mentioned materials prevails to the exclusion of the others, forming a bed of sand, or of clay, or of gravel, but these are usually of small extent. In the drift generally the sand, clay, gravel and pebbles are compactly bedded together forming what is usually called *hard-pan*.

The drift is very unequal in depth, varying from a few

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What is said of the valley of lake Champlain? What are some of the most common fossils? What do we find beneath the soil, alluvium and pleistocene, sand and clay? In what condition? What is it then called? What is its depth, and how has it been affected since deposited? What is said of the drift materials?

inches to 100 feet and upwards. Its condition was considerably modified during the pleistocene period by the action of the sea which then occupied the valley of lake Champlain, and by the streams which flowed into it. And since that period, water courses have been worn in it by existing streams and much of it washed down by these streams in the form of alluvium. The stones, pebbles and gravel found in the drift in Vermont, as is common elsewhere, are, for the most part, different from the rocks on which the drift rests, but are of the same materials, generally, as the rock formations known to exist to the northwestward of the places where the drift is deposited; and these materials are universally worn and rounded, as we find them in running streams, and on the shores of lakes, and on account of being thus rounded, the larger stones of the drift formation are called *boulders*.

In illustration of these matters, it may be remarked that boulders from the fossiliferous rocks found in *place*, along the shores of lake Champlain, are often found, containing their peculiar fossils, resting upon the unfossiliferous rocks far to the eastward. Boulders, from the lower members of the red sandrock along the lake shore, which is instantly recognized by any one acquainted with the formation, are found weighing several tons in Williston, Richmond and other towns, resting on the talcose slate formation, and in one case, a boulder of this kind, of two or three tons weight, has been met with to the eastward of Camels' Hump, in Duxbury. This boulder, was at least 20 miles from the nearest rock of the kind, *in place*, and about 700 feet above the level of the lake.

In the eastern part of Craftsbury, in the western part of Northfield, and in Stanstead in Canada, there exists

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Of their forms? What are the larger stones called? What is stated in illustration? What peculiar formation is mentioned in further illustrations? What is it called? Or, what do the balls consist of? What is said of the rocks under the drift?

a peculiar formation of granite, which has been found, *in place*, no where else. This granite contains balls, usually a little flattened, scattered in it like plums in a pudding. These balls are usually about an inch in diameter, and are composed essentially, of *black mica*, having the plates arranged in concentric layers, with a very thin deposit of quartz between the layers. Now, boulders from this formation, weighing several hundred weight, are found in Waterford, Ryegate, and other towns in the eastern part of the county of Caledonia, more than 30 miles from the ledges, from which they were derived. It is sometimes called Nodular granite.

5. *Drift Scratches.* The rocks upon which the drift materials lie, are every where found to have their surfaces worn down and smoothed by some agency, and, in many places, to have numerous, and nearly parallel, furrows, or scratches upon them; and as these lie very nearly in the direction in which the drift materials have been transported, they are supposed to have been produced by the same agency, and are therefore called *drift scratches*. The general directions of the drift scratches, and of the transportation of drift materials, is to a point a little east of south, but varies in different parts of the state, somewhat in conformity to the direction of the valleys and the ranges of mountains.

The smoothing and striation of the surfaces of rocks are most conspicuous when the earth is first removed from them. Exposure to the weather tends to obliterate them. These polished and striated surfaces are found in the lowest places, and on the highest mountains in the state. Mount Washington, in New-Hampshire, appears to be the only point in New-England, which was not reached by the agency which produced them. With regard to what this agency was, geologists

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Why are the furrows called drift scratches?—what their direction?—by what do they appear to be varied?—when most conspicuous?—in what places found?

are not fully agreed. Some ascribe it to waves of translation, and some, to marine currents and icebergs, when this part of the world was mostly under water, and, others, to glaciers, when the country was more elevated and colder than at present. The probability is that all these causes have been concerned in the production of these phenomena.

**LOCAL DEPOSITS.** Belonging to the quaternary division, there are three deposits which deserve notice. These are muck, shell-marl, and infusorial silica.

6. *Muck* is a deposit of partially decomposed vegetable matter. It consists of leaves and herbaceous plants, and decayed wood, collected in low wet places, and in the bottoms of shallow ponds. It is a valuable manure, but is much improved for sandy soils by a mixture of clay and lime, or shell marl. It is found more or less abundantly in all parts of the state.

7. *Shell-Marl* is a white substance, found in the bottoms of many ponds, and bogs, and in low places formerly occupied by ponds. It consists essentially of carbonate of lime, which has resulted from the partial decay and crumbling of innumerable fresh water shells, mixed with a small proportion of clay. At, and near, the surface of the beds, the shells are mostly entire, but are usually broken, and the particles finer in proportion to the depth.

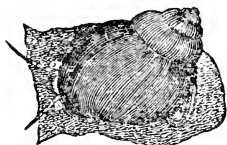
The species of shells are of the same kinds which are now living in our ponds. They belong mostly to the following genera; *Paludina*, *Limnæa*, *Planorbis* and *Cyclas*.

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How produced? What are mentioned as local deposits? What is muck? Its use?—where found? What is shell marl? Where found? Of what does it consist? What is said of the shells in it? What genera?



(8)

*Paludina.*

(9)

*Planorbis.*

(10)

*Cyclas.*

Marl beds exist only in those parts of the state where limestone is found. They are most common and extensive in the counties of Orange, Caledonia, Orleans and Grand-Isle. The most important beds will be noticed in the account of the several counties.

Marl is an excellent manure for sandy soils, which are deficient in lime; and mixed with muck, is probably the very best which can be applied to such lands. Burned like limestone, it makes a very good lime for mortar, or architectural purposes.

8. *Infusorial Silica* is a white substance, resembling fine marl in appearance, and formed like marl in the bottoms of ponds, and in low places under muck. It consists of the flinty shields of animalcules, and has accumulated from the decay of the successive races of these very minute beings in the same way that marl has, from the decay of the calcareous shells of fresh water molluscs.

The most extensive deposit of infusorial silica, known in the state, is in Hosmer's pond in the south western corner of Peacham. This pond is surrounded by granite hills, and covers about 250 acres. The infusorial deposit averages about six inches in depth, and is thought to cover the bottom of about two-thirds of the pond. When taken out and dried in lumps, it is a very good

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Where do these beds exist?—where most common? For what is it valuable? What is infusorial silica?—of what does it consist?—where is the most extensive deposit?—what is said of the pond?—of the extent of the deposit?—how does it

substitute for chalk. When dried and pulverised, it resembles magnesia in appearance; and hence the pond is sometimes called *Chalk pond*, and sometimes *Magnesia pond*. There is another small deposit of infusorial silica, in Maidstone, in Essex county.

The shields of more than 20 distinct species of animalcules are distinguished in these deposits, and they are some of them so very minute, that it would require more than five millions to cover a square inch.

9. *Clay Stones*. These are concretions which are formed in beds of clay, in various parts of the state. They exhibit an almost infinite variety of forms, and often appear as if turned in a lathe or skillfully carved by art, and hence they are every where regarded as objects of curiosity. Their most common form is that of a flattened sphere, but various forms are often blended together in the most grotesque and fanciful manner. They are formed by the mutual attraction and adhesion of particles, while the materials of the bed in which they are formed, are in a moist, plastic condition, and not by art, nor by running water, as many have supposed.

All claystones contain a large proportion of carbonate of lime, usually about one half, and hence they are never found in clay beds which do not contain lime. The usual ingredients in claystones are lime, alumina, silica, iron, and magnesia.

In many places, particularly in the pleistocene formation, the concretions contain a large proportion of iron and assume a cylindrical form, with a small opening along the axis like a pith, having the concretionary layers arranged concentrically around it like the layers of wood in a tree. They often very much resemble the limbs, knots, and roots of trees, and hence many sup-

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appear when dry?—how many species of animalcules have been distinguished in it?—how minute are some of them? What are clay stones?—what is said of their forms?—what form most common?—how are they formed?—what do they contain?—what the usual ingredients? What is said of concretions in the pleistocene formations?—what do they resemble?—are clay stones common? What is said of

pose them to be vegetable remains. One of the most interesting localities of this kind is near Appletree point.

Localities of claystones are more or less common in all sections of the state. In a clay bed at Mallet's bay, in Colchester, they are often found, formed around and inclosing, wholly or in part, marine fossil shells.

10. *Iron Ores.* The brown oxide of iron, or brown hematite, is the most abundant and valuable iron ore found in the state. It is found in beds usually, associated with and covered by the drift formation. These beds are most numerous and extensive along the western foot of the Green Mountains. The most valuable beds of this ore, which have yet been opened, are in Bennington, Pittsford, Chittenden, Brandon, Monkton and Colchester, on the west side of the mountains, and in Plymouth on the east side.

Associated with this ore at several places, the *oxide of manganese* is found in large quantities, particularly at Bennington, Chittenden and Plymouth. From the two former places much of it has been sent to market.

Manganese is used in the preparation of bleaching powder (chloride of lime) and by glass makers to correct the green tinge occasioned by the presence of iron. A certain proportion of it gives to glass a beautiful violet color, and a still larger proportion makes it black. Hence it is employed in pottery for violet and black glazings.

*Bog Iron Ore* is found in low, wet places, in various parts of the state, at many of which it is now in the process of formation.

*Iron Sand* is found at several places along the shore of lake Champlain, in considerable quantities, and it is found diffused in the sand and gravel over much of the western part of the state. At Clay point, in Colchester, through a space of several acres, the sand is strongly

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brown iron ore?—how situated?—where are beds most numerous?—where are the most important beds?—what is often associated with it?—where?—what its use? What is said of bog iron ore?—of iron sand?—of ochre?—of white clay?—for

cemented together by hydrate of iron and manganese, to the depth of eight feet or more.

Associated with brown iron ore, we usually find *yellow ochre*. Extensive beds of ochre are also found in parts of the state where no solid brown ore is known to exist. One of the largest of the deposits of ochre which has been opened in the state, is at Hydepark, in Lamoille county; but the beds in Bennington have hitherto yielded the greatest quantity for market.

11. *Pipe Clay, White Clay, or Kaolin*, is another kind of local deposit, which is found under circumstances very similar to those of the brown iron ore, and often associated with it. The most valuable beds of this clay, which have yet been opened, are in Bennington and Monkton. It is found also in Dorset, Wallingford, Chittenden, and Brandon. This clay is very valuable for the manufacture of fire bricks, stone ware, and the finer kinds of pottery.

The term *Kaolin* is now generally restricted to such clays as are known to have been produced by the decomposition of feldspar.

Beds of clay and sand, suitable for bricks and for coarse pottery, are found in almost every town.

Common bricks and earthen ware derive their brownish red color from the presence of iron, which, in burning, is converted into the red oxide of iron.

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## II. SECONDARY IN VERMONT.

### *Palæozoic—Lower Silurian.*

The secondary rocks in Vermont all belong to that lower division of fossiliferous rocks, which is known in geology under the name of *transition* or *palæozoic*, and to that subdivision denominated *lower silurian*. They

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what valuable? What is said of common clay? Why do bricks turn red in burning? To what do the secondary of Vermont belong?—to what subdivision?—in-

are embraced in two groups, the Champlain and the Taconic.

#### SECTION I. CHAMPLAIN GROUP.

The Champlain group consists of six members, viz: the Red Sandrock, Hudson River Shales, Utica Slate, Trenton Limestone, Isle la Motte Limestone, and Calcareous Sandstone.

*Red Sandrock.* The series of rocks which we comprehend under this name, extends from north to south along nearly the whole length of lake Champlain. The western limit of this series, lies, for the most part, some little distance from the shore of the lake to the eastward; but from Shelburne to St. Albans bay, it forms much of the lake shore. This western limit of the series is marked by a line of hills, which are usually steep and precipitous on the west side, having a gentle slope towards the east. Snake mountain, in Addison, Buck mountain, in Waltham, and the Sugar Loaf and Glebe hill, in Charlotte, are some of the most considerable uplifts. Lonerock point, in Burlington, and Mallet's Head, in Colchester, are in the same line of hills. This series of rocks has an average extent, from west to east, of about 5 or 6 miles, but varies considerably in different parts. The rocks all have an eastern dip, varying from  $5^{\circ}$  to  $25^{\circ}$ , and are succeeded on the east by the Taconic and Primary rocks.

The rocks of this series differ very much in color and in their composition, or lithological character. The lower strata are, in many places, considerably calcareous, that is, they contain considerable lime mixed with the siliceous sand. They are thick bedded, and, in some places, the stratification is so much obliterated as to give them the appearance of an igneous or unstratified rock. The color of this portion is often gray,

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what groups are they embraced? How many members in the Champlain group?—what are they? What is the extent of the red sandrock?—its western limits?—by what marked?—what are the names of some of them?—what its width?—the dip of the rocks?—do the rocks differ? What is said of the lower strata?—what of the

or variegated with different shades of reddish brown and yellowish white. Some of these strata are sufficiently calcareous to admit of being polished without much difficulty, and make a very beautiful variegated marble.

The middle portion of the red sandrock series is almost entirely siliceous, and is, through a great part of its extent, of a dark reddish brown color. It is the color of this portion which has given name to the series. Nor is this color uniform, nor, indeed, always present, even in the middle portion of the series. In some parts, the coloring matter seems to be almost, or entirely, wanting; and in places where the strata generally are most highly colored, we sometimes find a single stratum of white quartz sandstone, only a few inches thick, lying between two colored strata, and extending through a considerable distance. An example of this may be seen in Willard's quarry, half a mile south of the village of Burlington.

The colored strata of this series furnish a very beautiful stone for foundations and underpinnings of buildings, and, though somewhat refractory and difficult to work, it is extensively used for those purposes in the villages in the western part of the state. The foundations of the greater part of the buildings in Burlington are of this material.

Some of the strata of this series are so entirely siliceous and free from coloring matter as to be suitable for the manufacture of glass, and have been used to some extent for that purpose.

Glass consists essentially of silica (quartz) and potash or soda. Other substances are used with these in the manufacture of the different kinds of glass, among which are oxide of lead, lime, and manganese.

From the middle portion of the red-sandrock series

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middle portion?—what of the colored strata? For what have some of the strata been used? What does glass consist of? What do the strata become in proceed-

the strata become more and more calcareous in proceeding upward and eastward, and at length in many places pass into a very pure limestone. This limestone is generally of a bluish color, but in some places, as in the eastern part of Shelburne, its color is pure white. It makes excellent quicklime, which is extensively manufactured and transported into the interior of the State, where there is no good limestone.

*Limestone* consists of lime combined with carbonic acid. *Quicklime* is made by heating limestone in a kiln till the carbonic acid is separated from it and driven off in the form of gas. The stone is then much lighter than before it was heated, and has a strong attraction for water. If water be poured upon it, the water is consolidated in the lime, heat is given off, and the limestone crumbles to pieces in the form of a white powder. This process is called *slaking* the lime.

Portions of the limestone of this series may hereafter be found suitable to be worked for marble. This limestone is found in greatest purity in the towns of Charlotte, Hinesburgh, Shelburne, Burlington and Colchester.

The red sandrock series in Vermont contains very few fossils. Wave and ripple marks are very numerous and very distinct upon the strata in many places, and the marks of rain drops are also quite common. Impressions are also met with having much resemblance to the foot-prints of animals, but have not yet been positively ascertained to be such.

In several places in this formation there are layers made up of what have been called fucoides, but the forms are very indistinct.

The wave and ripple marks, the impressions of rain drops, &c., were made in the sand of the beach, which

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ing upward? What the color of limestone?—what use is made of it?—of what does it consist? How is quick lime made?—what the effect of putting water on quick lime?—what becomes of the water?—what is this process called? In what towns is this limestone purest? Are fossils common in this rock? What are numerous?—what impressions? Under what circumstances were these works

was afterwards consolidated into rock without destroying their form.

*Fucoides* are so called from their supposed resemblance to a genus of marine plants, or sea-weeds, called *fucus*.

In some of the strata in this formation in Highgate, which have the red color of the middle portion of the series, the fossils are quite numerous, but generally in a bad state of preservation. They consist for the most part of the central portions of the bucklers of trilobites. A few bivalve shells have been found at this locality, which appear to belong to the genus *Atrypa*.

*Trilobites* are the remains of crustacean animals which are formed of three lobes. The name is from *tres*, three, and *lobus*, lobe. Figure 11 exhibits their general form. Bivalve shells are such as consist of two parts like the clam, oyster, &c.



The minerals found in the red sandrock series are not very numerous. Red and brown oxide and sulphuret of iron are not uncommon. The brown oxide is found in abundance in Colchester in contact with siliceous limestone and covered with drift. Hornstone, jasper and jaspery iron ore, quartz crystals, and calcareous spar, are not uncommon in the siliceous limestone.

*Hudson River Shales.* The rock lying next beneath the red sandrock series is called by this name, because it is so fully developed along Hudson River. In Vermont these shales occupy a narrow belt along the east side of Lake Champlain, forming in many places the bank of the lake. This is the case through almost the entire distance from Charlotte to Highgate, Juniper

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made?—what layers are mentioned? Why are fucoides so called? What is said of the fossils in this rock in Highgate? What are trilobites? What are bivalve shells? What minerals are found in the red sandrock? What is said of the Hudson river shales?—why so called?—what do they occupy in Vermont?—what is



Island, most of the small islands east of Grand Isle and North Hero, and the township of Alburgh belong to this formation.

In some places these shales have an even slaty structure, but they are for the most part very much shivered and contorted, and abound in seams of calcareous spar. Many portions of these shales consist of flattened ovoid, or wedge-shaped masses, which readily separate from each other, and which have a fine black glossy surface resembling coal. This circumstance has led many to suppose that coal may be found in connexion with them, and in several places a considerable amount of labor has been expended in digging into them in the vain search for coal. These shales, though they may resemble in appearance some of the shales of the coal formation, are well known, by every geologist, to belong to a much earlier geological period.

The color of these shales is generally quite dark, and in many places a coal black, and the compact masses of it which are traversed in various directions by fine seams of white spar, are sometimes very beautiful.

Calcareous spar, sulphuret of iron, and quartz crystals are common in these shales, and the strata are in many places crossed by dikes of greenstone and porphyry.

No fossils have been found in these shales in Vermont, but in some places they abound in concretions.

*Utica Slate.* The Utica slate is a black shaly mass of rock lying beneath the Hudson River shales, and cropping out for the most part in Vermont to the westward of those shales. This formation occupies but a small extent of surface in this State, but is well exposed at numerous places along the shore of Lake Champlain to the southward of Burlington, and on many of

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said of their structure?—why have they been thought to afford indications of coal?—has coal been sought in them?—will it be found? What is the color of these shales?—by what are they traversed?—what are common in them?—do they contain fossils? What is said of Utica slate?—where well exposed?—what is said of

the islands to the northward of that town. It is in some places compact and thick bedded, and in others breaks into regular jointed masses. It rapidly disintegrates, or crumbles to pieces by exposure to the weather, assuming an ash-gray color. The line of junction between the Hudson River shales and the Utica slate in Vermont is not easily traced, A considerable portion of it is covered by the waters of the lake.

The Utica slate, as well as the Hudson River shales, forms the basis of an excellent soil, and it is a valuable material for the construction of roads. It is of little value as a building stone.

The fossils commonly met with (12) in the Utica slate in Vermont, are graptolites and trilobites. *Fig. 12* is a common form of graptolite.



*Graptolite.*

*Trenton Limestone.*—This rock occupies the place next below the Utica Slate, in the Champlain group. From the south end of the lake, it extends along the east shore as far northward as Charlotte, showing itself in the uplifts, at various places. It appears again in South Hero, and extends northward, through the western part of that township, and Grand Isle, and constitutes the southeastern and highest part of the Isle la Motte. It also caps some of the elevations near the Medicinal Spring, in Highgate.

This formation, though of limited extent in Vermont, is remarkably well characterized, and in many places, is made up almost entirely of fossils.

The kinds of fossils are very numerous in this formation, and in many places, a large number of species are mingled together, while in other places, the rock consists almost entirely of shells, belonging to a single genus. This is particularly the case with much of the Trenton limestone, in South Hero.

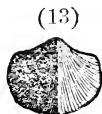
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its junction with the Hudson river shales?—what soil do these form?—what fossils are common? What place does the Trenton limestone occupy?—its extent?—is it well characterized?—what is said of its fossils?—in South Hero? What is the

The rock here, for a considerable extent, seems to be entirely made up of bivalve shells of the genus *Orthis*. This limestone stands fire very well, particularly, when the edges of the strata are exposed to it, and in early times, was used for fire-places, and hence it has acquired upon the islands, the local name of *fire stone*.

*Fig. 13 is a common form of Orthis.*

The limestone in South Hero, mentioned above, is of a grayish color, while the color of the Trenton limestone, generally, is quite dark, often nearly black.



The Trenton limestone is conformable to the Utica slate, at their junctions, which may be seen at numerous places along the lake shore. One of the most interesting of these junctions, is near the northwest corner of Pantou.

This limestone is in some places sufficiently firm to serve as a building stone, but for the most part, the strata are too thin and shaly for that purpose.

*Isle la Motte Limestone.* Under this name are included all those rocks which have been described under the names of Chazy limestone, Birdseye limestone, and Isle la Motte marble.

The Isle la Motte limestone lies lower in the series than the Trenton limestone, which may be seen resting directly upon it at many places along the east side of the lake; but it is more extensively exposed to view on the Isle la Motte than elsewhere in the State, and from this circumstance it has received its name.

Portions of this limestone, lying next to the Trenton limestone, are perfectly black, having a finely granular and compact texture, and are susceptible of a high polish. They have been worked at several places for *Black Marble*, but the quarry opened on the east side

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stone here called?—its color? What is said of its junction with Utica slate? Is it a good building stone? What are included under the name of Isle la Motte limestone?—how situated? Where largely exposed? What is said of portions of it

of the Isle la Motte furnishes a marble superior to any of the others.

The black marble of the Isle la Motte occupies the same position in the series of rocks, and is very similar to that worked at Glens Falls, but is thicker bedded and more perfectly compacted into one mass.

The Isle la Motte limestone generally, and particularly that portion of it which has been called Chazy limestone, is distinguished by several large and conspicuous fossils. The most remarkable of these are, the *Columnaria*, the *Orthocera*, and the *Maclurea*.

(14)

*Columnaria.*

(15)

*Orthocera.*

(16)

*Maclurea.*

The columnaria has been mistaken by some for petrified honeycomb, and the maclurea, for petrified snakes.

*Calciferous Sandstone.* This is the lowest of the Champlain group of rocks found in Vermont, and there is but one other below it in the series, which is the Potsdam sandstone. The Potsdam sandstone exists extensively on the west side of the lake at Keeseville, Birmingham, and other places, but none of it is found in Vermont; and the calciferous sandstone is exposed very sparingly on the Vermont side of the lake, unless further observation shall prove, as some geologists have suspected, that our red sandrock series is the

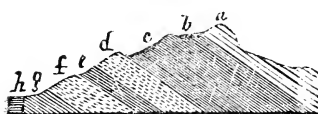
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for what worked?—where best? What other black marble is mentioned? For what fossils is the Isle la Motte limestone distinguished?—for what have they been mistaken? Which is the lowest of the Champlain group in Vermont?—what other is lower in the series?—where found? Is the calciferous sandstone much exposed

calciferous sandstone. The calciferous sandstone is very variable in appearance, but is usually of a grayish color with sparkling grains of lime and embedded masses of calcareous spar. It is an impure limestone, usually containing, besides carbonate of lime, a mixture of quartz and argillaceous matter.

The section below, (copied from the Second Annual Report of Prof. Adams on the Geology of Vermont, p. 163,) exhibits the order and position of the Champlain group as they are exposed by the uplift which forms Snake mountain in Addison county.

(17)



*Geological Section.*

*a.* Red sandrock forming the summit of the mountain. *b.* Debris from the Red sandrock. *c.* Hudson River Shales. *d.* Utica Slate. *e.* Trenton Limestone. *f.* Isle la Motte Limestone. *g.* Calciferous Sandstone. *h.* Clay.

#### TACONIC SYSTEM IN VERMONT.

*Taconic System* is the name which has been given to a series of rock formations, extending along the west side of the Green Mountains through the western part of Massachusetts, and Vermont. The name is derived from a range of high lands lying along the west line of Massachusetts, and extending into Vermont, called the *Taconic range*.

In Vermont this system occupies a large part of the counties of Bennington, Rutland and Addison.

The true geological position of the Taconic rocks is not yet well settled among geologists. While some regard them as belonging to the primary strata, and oth-

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in Vermont?—what is said of its appearance?—what does it contain? What does the section exhibit?—explain it? To what is the name of Taconic system given?—from what is the name derived?—what does the system occupy in Vermont? What is said of its geological formation? What is said of the final report of the

ers, as members of the Champlain, which have been very much altered by heat, there are still others, who regard them as a distinct group of palaeozoic rocks, all of which are older than the oldest of the Champlain group. On account of this disagreement among geologists, the publication of the final report of the geological survey of Vermont is anticipated with much scientific interest, as likely to aid in settling the question.

Commencing with the most western, or lowest of the series, we shall mention the different members in their order, proceeding eastward, all the rocks dipping in that direction.

*Taconic and Roofing Slates.* These extend through the western part of Rutland county, and a part of Addison county. They are quarried at several places in Rutland county, and furnish a very good material for roofing, and for the manufacture of writing slates, and slate pencils.

*Sparry Limestone.* This rock also, in Vermont, is confined principally to the southwest part of Addison county and the northwest part of Rutland county. Its ground color is bluish, or different shades of gray, divided and checked by numerous seams of calcareous spar.

*Magnesian Slates.* These slates lie to the eastward of the sparry limestone, and between it and the Stockbridge limestone. They are most fully developed in the northwestern part of Bennington county and southwestern part of Rutland county.

The magnesian slates are usually of a light gray color, and often of a greenish hue. They split into broad masses, the surfaces of which often have a pearly lustre and an oily feel. Veins and seams of white quartz are

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geological survey? In what order are the Taconic rocks mentioned? What is said of Taconic slates?—where quarried? What do they furnish? Where is sparry limestone found?—what is said of its color? Where do the magnesian slates lie?—what their color?—how do they split?—what veins in it?—from what does

often abundant in this slate. It derives its name from having a considerable proportion of magnesia in its composition.

*Stockbridge Limestone.* In an economical view this is far the most important member of the Taconic system, and one of the most valuable rock formations in the State, on account of the great abundance and variety, and the excellent quality of the marble which it furnishes. The color of this limestone is generally light, being in some places clear white, but more commonly dove-colored or variegated.

Commencing at the south line of the State in Pownal, this limestone forms a belt which extends northward through the counties of Bennington, Rutland and Addison, as far as the town of Monkton. This belt is on an average about five miles wide, having the magnesian slate on the west, and the quartz rock on the east. To the northward of Bennington county it occupies the valley of Otter Creek. Some of the most important marble quarries in this range will be mentioned under the names of the counties in which they are situated.

The name of this limestone is derived from the town of Stockbridge, Mass., which lies in the range as it extends southward through that State.

Along the eastern margin of the Stockbridge limestone are found the extensive beds of brown iron ore mentioned on page 53. Though usually detached and mixed with drift materials, there are strong reasons for thinking that they have their origin in this limestone.

*Granular Quartz Rock.* This rock forms a belt or range extending from the south line of the State to the northern part of Addison county, and lying between

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it derive its name? What is said of the value of the Stockbridge limestone?—what does it form?—how wide is it?—what bound it?—what does it occupy north of Bennington?—from what is its name derived?—what is found along its eastern margin?—what is there?—strong reason for thinking? What is said of the quartz

the Stockbridge limestone and the primary rocks of the Green Mountains. This range is quite irregular, and in some places is not readily traced. It is very barren in minerals, containing only occasional crystals of sulphuret of iron and schorl.

The Taconic rocks in general contain few minerals. Fossils are supposed to have been found in some of them; but, if so, they are certainly of very rare occurrence, and in a very imperfect state of preservation. These rocks generally have a steep eastern or south-eastern dip.

Further observation may possibly prove that a portion of the slates in the counties of Chittenden and Franklin, which we for the present include in the talcose slate formation of the primary, belongs to the Taconic system.

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### III. PRIMARY SYSTEM IN VERMONT.

The *primary system* embraces all the stratified rocks, which are older than the transition or palæozoic rocks. In these rocks, no fossils are found. They consist principally of gneiss, and several varieties of schists or slates.

The primary system in Vermont, occupies nearly three-fourths of the surface of the state. From the Champlain and Taconic series, eastward to Connecticut river, it embraces all the territory, with the exception of several considerable patches of granite and serpentine.

The primary system in Vermont may be considered under two general divisions, or as two great geological formations of nearly equal extent. The line dividing these, commences in the south line of the state,

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rock?—does it contain many minerals?—what is said of the Taconic rock in general?—what is said of their fossils?—of their dip? What may further observation prove? What does the primary system embrace? Are the rocks fossiliferous?



in the town of Halifax, and runs nearly north, through Newfane, Bridgwater, Ludlow, Bethel and Northfield, to Montpelier village, and thence a little east of north thro' Calais, Craftsbury, and Irasburgh, to Memphremagog lake. This line is easily traced through almost the entire distance from the southern boundary of the state, to Canada. All the primary rocks to the westward of this line, are embraced under the general name of the *Talcose slate formation*, and all to the eastward, under the name of the *Calcareo-mica slate formation*. These names are descriptive only, as indicating the prevailing rocks of each formation.

#### SECTION I. TALCOSE SLATE FORMATION.

This division of the primary, embracing the entire range of the Green Mountains in Vermont, averages about 14 miles in width, from the line of Massachusetts, up to the south line of Washington county, and from the latter, to the north line of the state, its average width is about 30 miles. That tract, which we have included in this formation, and which lies west of the Green Mountains, in the north part of the state, may hereafter be found to be, in whole, or in part, the magnesian slate, of the Taconic system; but for the present we include it in the talcose slate formation.

Adjacent to the Champlain group, in the counties of Chittenden and Franklin, the strata of this formation, have an easterly dip from  $30^{\circ}$  to  $60^{\circ}$ , and the rock consists principally of a shaly quartz. In proceeding eastward, the dip gradually increases, and the rock exhibits more of the characteristic of talcose slate, which is

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What is meant by fossil and fossiliferous? Of what do the primary consist? How much of Vermont does the primary occupy? What are its limits? How may it be considered? What line divides the two? Is it easily traced? What name is given to the primary west of this line? What to the east? What do these names indicate? What does the talcose slate formation embrace? What is its width? What is said of that part of it west of the Green Mountains? What is said of the strata adjacent to the Champlain group? What of them in proceed

an oily feel. In some places it has a greenish or chloritic hue, and is so compact and thick bedded as to make a tolerable building stone. This is the case in Jericho and Westford. In some places the rock is a conglomerate, that is, formed of rounded pebbles of different sizes cemented together.

Near the western foot of the Green Mountains, the dip of the strata becomes vertical, forming a synclinal axis. The line of this axis, passes through Berkshire, Enosburgh, Bakersfield, Cambridge, Underhill and Jericho. To the eastward of this line, the dip continues nearly vertical for several miles, being sometimes to the west, and at others to the east, forming a succession of synclinal and anticlinal axes. The dip then becomes uniformly west and continues so through the eastern part of the formation.

The slate of this formation varies very much in its appearance and composition. In several places it is very well characterized clay slate, as in Berkshire and Enosburgh. Along the west foot of the mountains is a narrow range of plumbaginous slate. It appears in Richford, Cambridge, Jericho and Huntington. In Cambridge it is used for marking as a substitute for black lead.

The rocks, which form the highest summits of the Green Mountain range, are of a coarse and often granular texture. In some places they would be called talcose slate, in others, mica slate, but a large proportion of it is in thick masses resembling gneiss, and it has been proposed to give to the whole, the name of *Green Mountain gneiss*. Much of the slate along the east slope of the mountains in the north part of the state, has a

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ng eastward? What of it in different places? Of what do conglomerates consist? Where does the dip become vertical? What does it form? Through what towns? What is said of the dip to the eastward of this line? What of it in the eastern parts of the Talcose formation? Is the slate of this formation variable? What examples? What is said of the rocks which form the highest parts of the Green Mountains? What general name has been proposed for these?

greenish tinge, and might properly be called *chlorite slate*.

Embraced in the talcose slate formation, is a narrow range of *steatite*, extending from north to south, through the whole length of the state, showing itself at short intervals. The line of this range passes through Troy, Eden, Stow, Moretown, Roxbury, Bethel, Bridgewater, Windham and Marlborough. Steatite is also found in Richford, Belvidere and Waterville.

In connexion with the steatite are immense beds of *serpentine*. This is particularly the case in Troy, Lowell, Waterville, Roxbury and Ludlow. The serpentine at several of these places, makes a beautiful variegated marble. The serpentine shows little or no signs of stratification, and has been generally regarded as an igneous rock, or one which has been melted by heat.

Throughout almost the whole extent of this formation, there is a very great deficiency of lime. To the northward of Plymouth, in Windsor county, there can hardly be said to be any which is of any practical importance. There are small beds of limestone, in Stockbridge, Moretown, Johnson, Waterville, Bakersfield and Richford, but none of these exceed a very few feet in extent. Quicklime has been manufactured from that in Johnson, but it is not of the best quality. At Plymouth, the limestone is abundant, and is extensively burned into lime, which is of good quality.

Iron ore, is found in this formation in numerous places. The most important localities, are Fairfield, Sheldon, Berkshire, Richford, Jay, Troy, Elmore, and Plymouth. The ore in Fairfield, Sheldon and Berkshire, is the red hematite, and probably all belongs to the same vein. The ore in Jay, is chromic iron, which is found

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What is said of the slate of the east slope? What range of steatite is mentioned? Through what towns? Where is steatite found out of this line? What is found in connexion with the steatite? Where? What is said of it? Is it stratified? Is lime common? Is there any north of Plymouth? At what place? What is said of them? Has lime been burned at any of them? What is said of Plymouth? Is iron ore found? What localities are mentioned? What is said of the three

in large veins, and is easily quarried. It is from this ore, that the chromic acid is obtained for manufacturing the *chromate of lead*, which is that beautiful paint known by the name of *chrome yellow*. It is also, used for the green colors on porcelain, and is employed in some of the processes of calico printing.

The iron ore in Troy, is mostly the titaniferous magnetic oxide. It is very abundant, in an irregular vein in serpentine rock. Works have been erected, and large quantities of this ore have been worked, but it has been found so difficult to work, that it has not hitherto yielded any profit to the proprietors.

The iron ore in Plymouth is very abundant, and is principally the brown hematite. It is situated near the junction of limestone and quartz rock, and beneath drift; a condition very similar to that of the brown iron ore mentioned in the account of the Taconic system, and it is not improbable that there is a tract here which belongs to the Taconic system.

Lead ore, (galena), is found in Morristown in a seam in the talcose slate, and particles of gold have been found in this formation in the lower part of Windham county. The sulphuret of copper is found in seams of this slate in Waterbury and on Sterling mountain.

The principal minerals in this formation are talc, actynolite and bitter spar in connexion with the steatite, asbestos and amianthus in connexion with the serpentine, octædral crystals of iron in the Green Mountain gneiss, and epidote. The latter is particularly abundant in the rocks in Berkshire. Very large and remarkably fine specimens of rock crystal are obtained in Waterbury and Middlesex, and chlorite and acicular crystals of schorl are found in numerous places.

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first?—of Jay? What is obtained from this ore? What its uses? What is said of the ore at Jay? Has it been worked to advantage? What is said of the Plymouth iron ore?—what is the inference? Where is lead found?—gold?—the sulphuret of copper?—What minerals are found in connexion with the steatite?—

Rock crystal is usually in the form of a six-sided prism, truncated or cut off to a point, at the end. It resembles cut glass, and is often erroneously called diamond.

## SECTION II. •

*Calcareo-mica Slate Formation.* This formation embraces the whole of that part of the State lying to the eastward of the talcose slate formation, with the exception of a few tracts of granite. It is called the *calcareo-mica slate* on account of its consisting, to a great extent, of impure limestone and mica slate interstratified, calcareo signifying limy.

The principal members of this formation are clay slate, mica slate, and strata and beds of siliceous limestone. There is a range of clay slate, frequently alternating with calcareous strata, along the west side of this formation, and adjacent to the talcose slate. It is largely developed in Randolph, Brookfield, Berlin, Calais, and Coventry. In Berlin a very good slate for roofing has been obtained from it. In the southeast corner of the State, through the towns of Guilford, Brattleborough and Dummerston, there is a range of clay slate, which furnishes very excellent roofing slate, and in which quarries have been worked, for that purpose, for many years. Clay slate also occurs in the eastern part of Orange county, and in Caledonia county, along the Connecticut and Passumpsic rivers, and in numerous other places.

The mica slate of this section is not in general very well characterized. Indeed, the slate generally seems to be a compound of clay slate, mica slate, hornblende slate, talcose slate and quartz slate. At some places one of these predominates, and, at others, another predominates. There are some tracts in Windham county and the lower part of Windsor county, where the mica

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with serpentine?—with the Green Mountain gneiss?—Where does epidote abound?—rock crystal?—schorl?—what is the form of rock crystal?—what does it resem-

slate is tolerably pure, and also in the northeastern part of the State, but in general it contains a large proportion of clay or argillite.

In the western part of Caledonia county hornblende prevails, giving the rocks the character of *hornblende slate*. In the southern part of Essex county they assume the character of talcose or chlorite slate, and in the northwest part of that county they are a siliceous or quartz slate.

The limestone of this formation every where contains a large proportion of sand. It has been burned for lime in several places, but is no where sufficiently pure to make good quicklime. It is useful in agriculture, to be applied to soils which are deficient in lime. But the lime from the beds of shell marl, which abound in this formation, is preferable to that made from the stone for all purposes.

The blue siliceous limestone of this formation is readily recognized, where it has been exposed to the weather by its rotten and rusty surface. This rotten coating is a loose siliceous sand, from which the lime, which cemented it together, has been washed out. Beyond the influence of the weather it will be found to be solid and compact. In some places, as at Hardwick and Berlin, this limestone is regularly arranged in parallel strata, showing very distinctly the planes of deposit; but it more commonly occurs in irregular beds of unequal thickness in the different varieties of slates.

The water of the wells and springs in the calcareo mica slate region, is generally hard. This is in consequence of the ease with which the limestone is dissolved by exposure to air and moisture, thus impregnating the water generally with lime. In this, we see the reason why marl beds are common on the formation,

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ble?—what is it commonly called?—What is said of the western part of Caledonia county?—What in the south part of Essex county?—in the northwest part?—What is said of the limestone of this formation?—does it make good quicklime?—is it of any use?—what is preferable to it?—how is this limestone recognized?—what

while there are none on the talcose slate formation, where the waters contain little or no lime.

The marl beds consist of the shells of molluscs, which have lived and died in the water, which occupied the places, where the beds are deposited. These shells are carbonate of lime, which the animals secreted from the water. Hence, it is plain that the water must be impregnated with lime, or these animals cannot live in it; and that, where the waters do not contain lime, beds of shell marl cannot be formed.

There are several mineral springs in this formation, all of which derive their medicinal properties from the presence of sulphuretted hydrogen. The springs at Newbury, Tunbridge, Williamstown, Hardwick and Brunswick, have all been places of resort for invalids.

The principal metallic ores found in this formation, are sulphuret of iron, and sulphuret of copper, or *iron* and *copper pyrites*, and sulphuret of lead, called also *galena*. Iron and copper pyrites are associated together, and exist in abundance at Strafford, Corinth and Brighton. From the iron pyrites at Strafford, most of the copperas used in the northern states, is manufactured. The small yellow cubes found in the slate, in many places, and which are often mistaken for gold, are iron pyrites, or sulphuret of iron. The richest veins of copper pyrites, are found in Corinth, and lead ore, containing a small proportion of silver, is found in Thetford.

The most common minerals in this formation, are the different varieties of tourmaline and garnet. The black tourmaline, or schorl, is found in very large crystals, which, when broken, have been mistaken, by persons

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is the coating?—how is it below the coating?—is it stratified?—how does it generally occur? What is said of the water of this formation? What reference has this to the marl beds! What do these beds consist of? Of what do the shells consist? What is the inference? Are there any mineral springs? What do they contain? What springs are mentioned? What ores in this formation! Where are iron and copper pyrites found together in abundance? What is said of copperas? of the yellow cubes found in slate?

ignorant of minerology, for anthracite coal. Very large crystals of this kind, are found in Bridgewater, Thetford, and other places.

In the siliceous limestone, in the western part of Caledonia county, are radiated or stellor crystals of black hornblende, which are often very beautiful. Rock crystal, actynolite, kyanite and numerous other minerals, are found in different parts of the formation.

#### IGNEOUS ROCKS IN VERMONT.

The only igneous unstratified rock in Vermont, which occupies any considerable extent of territory, is *granite*; and the granite is all confined to that division of the primary, which is embraced under the name of the calcareo-mica slate formation. It appears to have been forced up from beneath, through the primary strata, in ranges, which are, for the most part, very narrow from east to west, but often extending many miles from north to south, in the direction of the strike of the strata. This is particularly noticeable in the eastern part of Orleans and Washington counties, and in the western part of Caledonia county.

The most extensive tracts of granite are in Essex county and in the south-western corner of Caledonia county, and the adjacent parts of the adjoining counties. It was from the north-western part of this last tract, in the town of Barre, that the granite for the state house was procured. Towards the south-eastern part of the state, there are some isolated patches of granite, but they are all small.

In many places, the granite is seen traversing the other rocks, in the form of dikes, veins, and seams. This is particularly observable in Marshfield; and this

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What is the principal igneous rock? to what is it confined? How does it appear to have originated? What is said of the ranges? Where is this noticeable? Where are the most extensive tracts of granite? Is there any in the south-east part of the state? In what forms is it found in other rocks? What does this



fact, together with the fact that fragments of slate are found embedded in granite, makes it certain that the granite has been in a melted state since the formation of the slate.

Granite boulders are found scattered over all the north-eastern part of the state, some of which are of very great size. From a single boulder, in Greensborough, the material for a good sized stone house, including the walls of the cellar, were obtained without using it all up. Another boulder, in this town, is 41 feet long and 22 high, and is calculated to weigh 1200 tons. About half a mile from the latter, there are two other boulders, which are about 80 feet apart, and both are so nicely balanced upon other rocks as to be easily moved by the hand, and hence they have acquired the name of *rocking stones*. Their relative situations will appear from the cut. They are

(18)



both considerably elevated above the surrounding country. The most elevated is 9 feet high and twelve feet long, weighing about 80 tons, and the other 8 feet high and 11 long, weighing about 50 tons. Fig. 18 will afford some idea of the position of these stones.

The granite contains very few minerals, excepting those which enter into its composition. In Cabot, near Joe's pond, feldspar is found in large wedge-shaped masses, and in Craftsbury the granite contains flattened balls, which are made up of concentric layers of mica. These are about an inch in diameter, and are scattered in granite like plums in a pudding. The name of *nodular granite* has been given to the rock. It has been found in place only in Craftsbury and Northfield,

prove? What is said of granite boulders? What was made from one in Greensborough? How large is another? Describe the rocking stones? How large are they? Does granite contain many minerals? What is said of Joe's pond, in Cabot? What is in the granite of Craftsbury? How large? What name is given

and in Stanstead, Canada. These places lie in the direction of the strike of the stratified rocks. Large boulders, which were doubtless transported from this range, are found scattered towards the south-east, as far as the eastern part of Caledonia county.

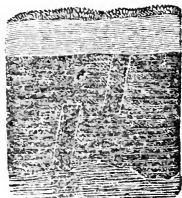
Greenstone and Porphyry, the other igneous rocks in the table, are found only in dikes in Vermont.

*Greenstone dikes* are found in all the different formations, but are not equally common in all. In the Taconic rocks, and in the talcose slate formation, they are exceedingly rare. They are found, but quite sparingly, in all parts of the calcareo-mica slate formation, but they are far most common in the Champlain rocks, particularly in the neighborhood of Burlington.

The most common width of the greenstone, or trap dikes, is from 4 inches to 5 feet wide. The greatest number of them are about 2 feet. The greater part of them cross the stratified rocks nearly at right angles with the strike of the rocks, and descend nearly perpendicular into the rock. In some places, they may be traced for several miles in nearly a straight course across the edges of the strata, but they sometimes terminate suddenly, and commence anew at some little distance to the right or left, and then proceed onward again in the same direction as before. Such an occurrence is called a *fault* in the dike.

(19)

Fig. 19, represents a dike 10 inches wide in the slate, on the lake shore at Clay Pt., Colchester. The fault is an offset of about three feet. The highest part of the rocks, above the outcrop of slate is sand.



to the granite? Where found in place? Where are boulders found? What is said of greenstone and porphyry? Where are greenstone dikes found? Where are they rare? Where sparingly found? Where most common? What is said of their width? How? How do they cross the strata? What is said of their course? What is meant by a fault in a dike? What is represented in the figures?

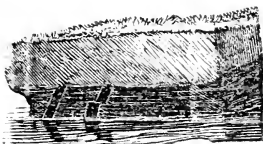
At Hubbell's falls, in the town of Essex, there are two faults in the same dike. In some places these dikes have a concretionary structure, and by exposure to the weather come to pieces in the form of balls. In other places, the greenstone is filled with whitish crystals, and is said to be amygdaloidal. One of the most interesting of this kind is on a small island in lake Champlain, a little north of Colchester point. Signs of columnar structure are seen in some few of the dikes.

The *Porphyry dikes* are mostly confined to the southwestern part of Chittenden county. Like the greenstone dikes, their general course is from west to east, but they are much more irregular in their direction and width. In some places they are forced up through the slate, in large rounded masses. Their color varies from dark chockolate brown to a light cream color. In some, the embedded chrystals are very numerous; in others, rare. In several no crystals are seen. These are more properly called *feldspathic dikes*.

One of the most interesting places for examining of these dikes, is at Nash's point, in Shelburne, where the means are afforded for determining the relative ages the greenstone and porphyry dikes. There, two greenstone dikes have been plainly cut off by a mass of porphyry, flowing laterally between the layers of slate, thus proving that the porphyry is more recent than the greenstone. Fig. 20, represents this.

(20)

It will be seen by the figure that there is a fault in one of the greenstone dikes. The more recent origin of the porphyry is also infered from the general fact that the porphyry is frequently found to have



What occurs in Essex? What is said of structure of some of these dikes? When are they said to be amygdaloidal? To what part are porphyry dikes confined? What is said of their course? Are they as regular as the greenstone dikes? What is their color? What is said of their crystals? What are those called which contain crystals? What locality is mentioned? Be cribent? What does it prove? What general fact is mentioned as proving the same?

flowed literally between the strata of the rocks, while the greenstone is never found to have done so, proving that the latter was formed under a much greater pressure than the former.

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### III. CLIMATE AND METEOROLOGY.

1. *Climate* is from a Greek word, which signifies, to incline. It originally had reference to the inclination of the earth's axis to the horizon, which occasions the inequalities of day and night. The ancient geographers divided the space between the equator and the poles into 30 parts, which they called climates, and the limits of these spaces was determined by the lengths of the longest days. Climate, in this sense, belongs strictly to mathematical geography.

Climate, in its present ordinary acceptation, has reference to the condition and various modifications of the atmosphere. In this sense, its meaning is very nearly the same as that of *meteorology*, which embraces the various phenomena which have their origin in the atmosphere. The term, *meteor*, is more commonly applied to those lights, which appear and disappear suddenly in the heavens, such as fireballs, shooting stars, the rainbow, and the aurora borealis; but, in its general acceptation, it embraces winds, clouds, rain, hail, snow, and, indeed, every kind of atmospheric phenomenon.

*Phenomenon* is a term used to denote some unusual natural appearance, or appearance, the cause of which is not immediately obvious. *Phenomena*, the plural, is

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From what is the word climate derived? To what did it originally refer? Upon what did the limits of climates depend? How many were there? What is the present acceptation of the term? What is embraced in meteorology? What the most common application of the term meteor? What is its general sense? What is meant by phenomenon?—Phenomena? In what Zone is Vc.? In what

used when more than one such appearance is spoken of at the same time.

2. *Temperature.* Vermont, though situated in the middle of the north temperate zone, is subject to very considerable extremes, both of heat and cold, and the changes of temperature are often very sudden. The usual annual range of the thermometer, in this state, in the shade, is from about  $92^{\circ}$  above to  $22^{\circ}$  below the zero of Fahrenheit's scale. It is sometimes known to rise as high as  $100^{\circ}$ , and at other times to sink as low as  $36^{\circ}$ , or even  $40^{\circ}$ , below zero.

For some time after the settlement of Vermont, the thermometer was hardly known in this part of the country; and since that instrument has become common, very few meteorological journals have been kept, and those few have not, in general, been kept with sufficient care to render them of much value; nor have they been preserved in a condition to be accessible to those who may wish to consult them. Hence we possess few accurate data, either for determining the relative mean temperature of the different sections of the state, or the question with regard to a change of climate, corresponding with the clearing and cultivation of the country.

The following table contains the mean results of observations of temperature continued at each of the places named through 13 years, and as the notes were made at the same hours of the day at each place, viz: sunrise 1h. P. M. and 9 P. M., the results probably exhibit pretty accurately, the difference of mean temperature between the central mountainous parts of the state and the lower parts of the valley of lake Champlain. By this table it appears that the mean temperature of Burlington, is  $5.4^{\circ}$  warmer than that of Williamstown. The height of the place where the observations were made, in Wil-

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part? What is said of the changes of temperature? What the usual range of the thermometer? What the extreme? What is said of meteorological observations in Vt. What is the consequence? From what observations were the results in the table obtained? What do they exhibit? How much warmer is Burlington than Williamstown? How much highest is the latter? In what way may the main

Williamstown, above the sea, exceeds that of Burlington about 1000 feet.

	Williamstown.	Burlington.		Williamstown	Burlington.
January,	15.5°	19.4°	July,	63.5°	69.1°
February,	15.7	20.5	August,	61.3	68.6
March,	25.5	30.6	Septem.	52.9	59.7
April,	33.2	43.2	October,	41.8	46.9
May,	50.3	55.1	Novem.	39.1	35.8
June,	59.5	61.5	Decem.	18.8	23.9
				39.4	41.8

The mean annual temperature of a neighborhood, may be ascertained very nearly from the temperature of deep wells, and perennial springs. The the temperature of the wells in Burlington, indicates a mean annual temperature of 45°, differing very little from the result of the daily observations, as shown in the table.

In penetrating into the earth, it is found, that for a certain distance downward, the temperature varies with the season; but on reaching a certain point, the temperature is then found to be uniform through the year, agreeing with the mean annual temperature of the surface. This point is usually at about the depth at which the springs are formed, which supply our wells, and which issue from the earth; and hence, the temperature of their waters, affords a near approximation to the mean temperature of the climate.

Below the point of uniform temperature, the heat increases in descending. In the abortive attempt to obtain salt by boring into the rocks at Montpelier, this fact was fully corroborated. The boring was extended downward about 800 feet, and, at that depth, the temperature was found to be some degrees warmer, than at the depth of 50 feet.

The increase of heat is greater in some places, than in others, but by observations made in deep mines, in different parts of the world, it has been found that the average rate of increase, is about one degree of Fah-

temperature of a place be found? What is found in penetrating into the earth? What is said of the temperature of a certain point? --of the springs which originate

renheits thermometer, for every 50 feet. Supposing this rate of increase to continue, at the distance of 60 miles, the heat would be such as to melt all the earthy materials, and render them fluid.

3. *Winds.* For small sections of country, the prevailing winds usually take their direction from the position of the mountains and valleys. This is very much the case in Vermont. Through the valley of the Connecticut, and of Lake Champlain, the winds for the most part blow either from the south, or from the north or north-west, while winds from the east or west are, comparatively of rare occurrence. Along our smaller rivers, particularly the Winooski and Lamoille, the prevailing winds are from the north-west. The winds occasionally do some damage in Vermont by unroofing buildings and prostrating forest trees, but it is very seldom. In the valley of lake Champlain, the southerly winds are to the northerly about in the proportion of 5 to 4.

4. *Rain.* The quantity of water which falls in rain and snow in any one year, does not probably differ very considerably in the different sections of the state; but the quantity which falls at the same place in different years, is very variable, as may be seen by the following table, which exhibits the fall of water at Burlington, in inches and decimal parts, during ten successive years.

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nate there? What takes place below this point? Where proved?—What the rate? At what depth at this rate would all be melted? Upon what does the direction of winds depend? Is this the case in Vt.? How do they blow in the valley of the Connecticut and Lake Champlain? What is said of the fall of water at different places?—At same place? In which month greatest? In which

TABLE

*Of the Monthly and Annual fall of Water at Burlington.*

Mo.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	1847.	Avr.
Jan.	2.52	0.85	1.26	3.49	1.04	0.71	2.29	2.38	1.72	2.80	1.91
Feb.	1.32	1.20	1.89	0.80	3.75	1.43	0.73	2.52	1.47	1.85	1.70
Mar.	1.10	1.43	3.05	3.23	1.97	2.12	2.35	2.48	2.20	2.10	2.20
Apr.	1.34	1.66	4.69	3.54	2.52	0.82	1.43	2.22	0.91	3.15	2.32
May	4.51	2.43	2.46	2.28	1.55	2.47	4.40	3.39	3.18	1.85	2.85
June	5.37	3.70	2.84	5.16	3.24	4.58	2.08	2.08	3.63	5.05	3.87
July	3.25	6.26	4.18	2.87	4.62	2.59	5.35	4.51	5.08	4.05	4.28
Aug.	2.41	1.91	3.51	1.40	1.74	2.09	3.46	2.37	0.48	3.12	2.25
Sep.	1.33	2.91	4.71	3.62	3.80	1.80	1.36	5.62	3.78	4.69	3.36
Oct.	2.98	0.45	3.66	0.83	4.10	5.03	5.11	2.26	2.65	3.69	3.69
Nov.	3.78	2.57	2.25	2.47	2.32	1.63	0.57	4.00	2.88	2.13	2.46
Dec.	0.92	2.68	2.62	3.02	3.20	1.48	2.08	2.21	1.68	4.07	2.40
Tot.	30.83	27.90	37.19	32.71	33.85	26.75	31.21	36.04	29.66	38.65	32.69

By the above table it appears that the greatest average quantity of water falls in July, and the least in February. These results, however, have reference only to Burlington. They may be found to vary in different parts of the state. There is reason to think that the annual fall of water, at Burlington, is less than in some of the other parts of the state. The quantities in the table include what falls in snow and hail, as well as rain.

The depth of water, which falls in a rain storm, or thunder shower, is much less than is generally supposed. One inch of water in a thunder storm, or in a rain of 24 hours, is a large amount. During the whole period embraced in the above table the water of a single shower, has not in more than one case exceeded two inches, and in only one case has it exceeded three inches in 24 hours. The prevailing notion, that the water sometimes falls to the depth of 5 or 6 inches in a single storm, is altogether an illusion.

least? What do the quantities include? What is said of the rain in a thunder storm?—of the rains in the ten years embraced in the table? What of a prevailing notion?



5. *Snow.* The ground is usually covered with snow about four months of the year, or from the first of December to the beginning of April. The snow falls earlier and deeper, and lies later upon the high lands, than in the valleys. The most severe snow storms are usually accompanied by a northeasterly wind. Less snow falls at Burlington, than in most other parts of the state. The following table exhibits the amount, which fell, at Burlington, in each of the last eleven winters.

1837-8 . . .	60 inches	1842-3 . . .	115 inches
1838-9 . . .	41 "	1843-4 . . .	73 "
1839-40 . . .	43 "	1844-5 . . .	75 "
1840-1 . . .	92½ "	1845-6 . . .	73 "
1841-2 . . .	61 "	1846-7 . . .	110 "
		1847-8 . . .	67 "

In the winter of 1845-6, there was uninterrupted good sleighing in Burlington from December 1, to March 15, 104 days, a much greater amount than had been known for many years.

The annual amount of snow is thought to be less now than when the country was new, and the amount of good sleighing much less, and more precarious.

6. *Seasons.* During the winter the ground is generally covered with snow, and the cold often severe. The snows begin to disappear the last of March, and are usually gone early in April, and spring grain is generally sown and gardens planted in that month; but the opening of spring is liable to a variation of at least two weeks. Indian corn is usually planted between the 15th and 25th of May, and is ripe in October. Hay making commences about the 4th of July. Severe frosts cease about the 10th of May, and begin again the last of September. Robbins and song sparrows return about the 21st of March, barn swallows about the 28th of April.

How long is the ground usually covered with snow? Where deepest? What is said of snow at Burlington? When the greatest quantity? least? most sleighing? How much? How does the present compare with early times? When do snows usually disappear; In the spring variable in opening; When is corn planted? When ripe? haying commences; frosts cease; begin; robins return; barn swallows? Currant blossom? plums? cherries? apples?

Currants blossom about the 12th of May, plums and cherries the 18th, and apples the 25th.

It is found by observation, that in cold weather, when it is clear and calm, the valleys are coldest, but when cloudy, or windy the high lands are coldest. Vegetation upon the low lands and along the margin of the lakes and large streams, is, in the spring, a week or ten days earlier than upon the high lands and mountains; but frosts, in the fall, occur earliest upon the low lands, allowing to each nearly the same time of active vegetation. The low lands, however, enjoy a higher mean temperature, and bring fruits and vegetables to maturity, which do not succeed well upon the higher lands.

There are several phenomena connected with this subject, which many people understand practically without knowing their cause. In summer, when there is much dew, in the morning, a fair day is expected;—when it is cool, calm and clear, at night, a frost is feared. But if there be no dew, foul weather is apprehended, although the sky may be nearly clear;—and if, at night, it be cloudy, or windy, although quite cold, no frost is expected.

In clear, calm weather, after the sun sets, the earth's surface soon becomes cooler than the air above by its radiation, in consequence of which the moisture in the air is condensed upon the surface in the form of dew. If the cooling be sufficient to reduce the surface to the freezing point, the dew becomes frozen in the form of hoar-frost, and this often takes place while the air, generally, is several degrees above the freezing point. When the atmosphere is cloudy or hazy, the heat which the earth's surface loses by radiations is restored by the radiation from the clouds and vapor, and when it is windy the warmer parts of the air are continually brought down to the surface.

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What is said of the temperature of vallies and high lands?—of vegetation?—of frosts? What does a copious dew indicate?—the absence of dew? When is frost feared? How is dew formed?—frost? Why have we no dews when it is hazy, cloudy or windy?

6. *Freezing of Lake Champlain.*—The narrow parts of Lake Champlain, become frozen so as to interrupt navigation through the Lake, early in December, and the broadest parts are closed over about the first of February. The lake usually opens again early in April, and is again navigable about the 20th of that month. The usual period of navigation through the entire length of the lake extends from the 20th of April to the 28th of November. The broadest part of the lake, between Burlington and Port Kent in New York, continues open for navigation till some time in January.

When the lake opens late in the spring, the ice sometimes disappears so suddenly that many have supposed that it sinks. But this is not so. At such times, the water under the ice being several degrees above freezing, and the ice having become very porous, whenever a rent is made in it, and the wind high, the agitation of the water causes it to dissolve almost as readily as so much snow. The lake has been known to be passable by persons on foot on one day, and to be clear of ice the next, but such occurrences are rare, and only take place with a high wind when the ice has continued later than usual upon the lake in the spring.

7. *Anchor Ice.* During the severe cold weather of winter, ice is sometimes seen formed upon the stones beneath the water at the bottom of streams, where the current is rapid and considerably agitated. This is called *anchor ice*. In order to the formation of anchor ice, it is necessary that the water of the stream and the stones at the bottom be first cooled down to the temperature of freezing. The stones then act as nuclei upon which the crystals of ice are formed, and to which they adhere by attraction. Under these circum-

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When does lake Champlain usually close and open? What the period of navigation? What is said of the broadest part? What is said of the disappearance of the ice? Does it sink? How explained? What has been known of it? What is found in streams? What is it called? What is necessary to its formation? What the process? What phenomenon is mentioned?

stances the ice, which is lighter than water, is said, sometimes, to accumulate in such quantity as to lift the stones from their beds, and float them down the stream.

8. *Indian Summer* is a name given to a period, usually of about two weeks, which occurred between the middle of October and the first of December, in which the weather was very calm and warm, and the atmosphere filled with smoke. These seasons appear to have been very regular in their occurrence and marked in their character when the country was new, but they have now become so irregular and illdefined as almost to have ceased to attract attention.

9. *Smoky Atmosphere*. During the spring and fall there are usually a number of days in which the atmosphere is filled with smoke, and the opinion has prevailed, said to have been derived from the Indians, that there must be at least 30 smoky days both in spring and fall, and that the setting in of winter was not to be feared in the fall till that number had elapsed. But the number, 30, has now ceased to be a charm to delay the advance of winter.

10. *Dark Days*. During the occurrence of the smoky days in spring and fall, the atmosphere sometimes becomes so much filled with smoke, vapour and clouds, as almost to convert the day into night. The most remarkable occurrence of this kind, on record, was on the memorable 19th of May, 1780, denominated emphatically the *Dark Day*. The darkest days in modern times were in the fall of 1819 and in the spring of 1820.

11. *Fire Balls and Earthquakes*. Several of those meteors called fire balls have been noticed in Vermont. One of these passed over the southern part of the State on the 23d of Feb. 1819. Its diameter was computed to be one-third of a mile. Another similar meteor was seen

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what is meant by Indian summer? when does it occur?—what is said of it—what of smoky atmosphere?—what tradition?—what is said of Dark Days?—what one is memorable?—what said of fire balls?—what ones mentioned?—what the

on the 9th of March, 1822, and another was seen from the north part of the State on the 28th of May, 1834. The concussion of the atmosphere, occasioned by the last mentioned meteor, caused a trembling of the earth which would have been mistaken for an earthquake, produced by some force within the earth, if the meteor had not been seen. Very many of the earthquakes noticed in New England, have probably been produced by meteors.

Meteors of this kind often throw off fragments, which fall to the earth. These are called *meteoric stones* or *meteorolites*. A large quantity of meteoric stones fell to the earth from a meteor which passed over Weston in Connecticut on the 14th of December, 1807.

12. *The Aurora Borealis* has been a very common meteor in Vermont from the first settlement of the State; but in some years it occurs much more frequently, and is more remarkable in appearance, than in others. Its most common form is that of streamers shooting up from the horizon towards the zenith, or of concentric arches spanning the northern portion of the heavens. One of the most remarkable exhibitions of this meteor was on the evening of the 25th of January, 1837. It appeared in the form of two broad belts, one a deep red and the other white; but the red light so far predominated as to give a bloody hue to the snow and all visible objects. The aurora borealis is probably produced by electricity, but the manner in which it is produced is not well understood.

13. *The Variation of the Magnetic Needle* is the deviation of the north end of the needle from the true north point of the horizon. Very few observations have been made in Vermont to determine this variation; and these few

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effect of the last?—what the inference? What do meteors throw off?—what example mentioned?—What is said of the Aurora Borealis?—of its forms?—what remarkable one?—how is this meteor produced? What is meant by the variation of the needle?—has it been well determined in Vermont?—what appears?—what was it in 1805?—what since?—present variation?

have been made with so little care and with such imperfect instruments that very little reliance can be placed upon them. It appears, however, that the variation has always been towards the west since the first settlement of the State—that in 1805, the western variation in the central parts of the State was 5 or 6°, and that it has nearly doubled since that period. The present variation at the north line of the State is now about 12°, and at Burlington about 10°.

*Table of Magnetic Variation observed in Vermont.*

Place of Observation.	Date.	Vari. west.	Latitude.	Lon. N. G. H.	Authorities.
Burlington,	1793	7° 38'	44° 28'	73°	Dr. Williams,
"	1818	7 30	"	"	J. Johnson, Esq.
"	1822	7 42	"	"	"
"	1830	8 10	"	"	"
"	1831	8 15	"	"	"
"	1832	8 25	"	"	"
"	1834	8 50	"	"	"
"	1837	8 45	"	"	Prof. Benedict.
"	1840	9 42	"	"	J. Johnson, Esq.
Rutland,	1789	7 3	43 37	72	Dr. Williams.
"	1810	6 4	"	"	"
"	1811	6 1	"	"	"
Ryegate,	1801	7 0	44 10	72	Gen. Whitelaw.
Holland,	1785	7 40	45 0	71	"
St. Johnsbury,	1837	9 16	44 26	71	Prof. Twining.
Barton,	1837	10 51	44 44		"
Montpelier,	1829	12 25	44 17	72	Exec. Docu's.
Pownal,	1786	5 52	42 46	72	Dr. Williams.
Canaan,	1806	9 00	45 0	71	"

# STATE OF VERMONT.

## PART SECOND.

### POLITICAL GEOGRAPHY.

#### I. TABULAR VIEW.

First settlement, - - -	1724	Sq. miles(exclusive of lake C.)	8,551
Government organized, -	1778	Population in 1840, - -	291,948
Admitted into the Union, 1791		Pop. to a square mile; - -	34½

#### COUNTIES.

Counties.	Incorporated.	Settled.	Population 1840.	No. of Towns	Square miles.	Pop. to sq. mile.	Gr. List. 1847*
I. Addison,	1785	1731	25,087	23	719	33	\$81,770
II. Bennington,	1779	1761	16,872	17	612	27½	46,106
III. Caledonia,	1792	1763	21,891	18	640	34	51,723
IV. Chittenden,	1787	1774	22,977	15	485	47½	68,925
V. Essex,	1792	1764	4,226	17	620	7	8,653
VI. Franklin,	1792	1783	24,531	14	549	44½	49,765
VII. Grand Isle,	1802	1782	3,883	5	83	48	9,278
VIII. Lamoille,	1835	1783	10,475	12	431	24½	22,704
IX. Orange,	1781	1762	27,873	17	615	45½	71,351
X. Orleans,	1792	1788	13,634	19	689	20	27,022
XI. Rutland,	1781	1761	28,195	25	862	33	98,622
XII. Washington,	1810	1783	23,506	17	571	41	54,423
XIII. Windham,	1779	1724	27,442	23	782	35	79,034
XIV. Windsor,	1981	1763	40,356	23	893	45	112,561
			291,948	245	8,551	34½	784,437

\*The grand list is only the *one hundredth part* of the ratable property of the state. It serves; however, to indicate the relative wealth of the different counties and towns.

When was the first settlement in Vermont?—the government organized?—admitted into the union? How many square miles? What is meant by a square mile? What the difference between two square miles and two miles square?—population in 1840?—to a square mile? Which county was first settled?—next? Which county is most populous?—least? Which largest?—smallest? Which has most persons to the square mile? Which fewest? Which has the highest list?—lowest?

## ORIGIN OF THE GOVERNMENT.

1. *Claims of Jurisdiction.* Previous to any settlements within the present limits of Vermont, what is now the southeast corner of this State was supposed to be a part of Massachusetts; and, in 1724, Massachusetts built fort Dummer in what is now the township of Brattleborough. In 1741 the north line of Massachusetts was surveyed, and fort Dummer was found to be to the northward of that line, and, as was supposed, within the limits of New Hampshire, both of those provinces claiming jurisdiction as far westward as to a line 20 miles east of Hudson river.

2. *Township Grants.* In January, 1749, Benning Wentworth, governor of New Hampshire, made a grant of a township lying, as he supposed, on the west line of that State, and which, in allusion to his own name, he called Bennington. This was the first grant of land within the present State of Vermont. Other townships were, however, granted soon after, and in the course of 15 years they amounted to 138. During this period a violent controversy arose between New Hampshire and New York, both claiming jurisdiction over the territory. In the mean time extensive settlements had been made under New Hampshire titles. In 1764 the jurisdiction of New York was confirmed by a royal decree, but New York refused to confirm the grants made by New Hampshire, and proceeded to regrant the lands; for which was demanded an exorbitant fee. The settlers under grants from New Hampshire refused to pay this fee, or to relinquish the titles for which they had paid to New Hampshire. This brought on a controversy between New York and the settlers under grants from New Hamp-

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When was fort Dummer built?—where?—in what was it supposed to be? When was the north line of Mass. surveyed?—what was found?—what supposed? How far did these provinces claim? Which township was first granted in Vermont?—when?—by whom? Why so named? How many grants in 15 years? What other?—what took place in 1761?—what did N. Y. do?—what did the settlers do?



shire, and hence the whole territory in dispute became known to the world as the *New Hampshire Grants*.

3. *Towns*. Each township charter granted by New Hampshire provided for the organization of the town, whenever the settlement was sufficiently advanced, by the election of certain town officers, and by the adoption of such regulations as the condition of the town was thought to require.

The townships were generally six miles square, containing 23040 acres, and divided into 72 shares, of 320 acres each. Four of these shares were reserved for public rights, viz.: one for the society for the propagation of the Gospel, one for a glebe for the Church of England, one for the first settled minister of the Gospel, and one for the benefit of schools.

The above mentioned society for propagating the Gospel, is in England; but the avails of the grants made to that society, in Vermont, are enjoyed by the Protestant Episcopal Church in this State. The glebes for the Church of England have been appropriated by our State Legislature for the support of schools.

4. *Councils of Safety*. As early as 1770, several towns had become organized, and soon after this period they began to organize *Councils of Safety* in the several towns for the purpose of a more effectual opposition to the unjust claims of New York; and at length formed, for the same object, a general *Council of Safety*, consisting of delegates from the several towns.

5. *Vermont Independence*. By these councils, or committees, the affairs of the New Hampshire Grants were managed till 1776, when about 50 towns had become organized. It was then agreed to call a convention to consist of delegates, to be chosen by the several orga-

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—what did this produce?—why was the country called the N. H. Grants? What was provided for in the town charters? What the size of the townships? How many acres? More? What public rights reserved? Where is the society for propagating the gospel? What is said of the glebes? How early were towns organized? Councils of safety? What their object? How long were affairs managed by these councils? What was then done? When did it meet?—what did it

nized towns. This convention met at Westminster on the 15th of January, 1777, and on the following day declared the territory, usually called the New Hampshire Grants, to be a free and independent State, to be hereafter called *New Connecticut alias Vermont*. On the 4th of June following, this convention met again, at Windsor, and resolved to drop the New Connecticut and the alias and to retain VERMONT alone as the name of the State.

6. *Constitution*. On the 2d of July, 1777, delegates from the several towns met in convention at Windsor, and adopted the first constitution of the State. This constitution was revised in 1786, and again in 1792, and was adopted in its present form on the 4th of July, 1793. Since that time there have been several amendments, the most important of which were made in January, 1836, and by which the old council was abolished and a Senate substituted as a co-ordinate branch of the Legislature.

7. *Vermont Charters*. Somewhat more than half of our present territory had been granted before Vermont assumed the powers of self-government, and the remaining portion was, in the course of a few years, granted by the government of the State. The Vermont charters were similar in many respects to those granted by New Hampshire. In most of these one share was reserved for the support of the Gospel in the town, one for the first settled minister, one for the support of schools, one for the support of a county grammar school, and one for the support of a state university.

8. *Origin of Political Power*. All political power originates in the will of the people. The inhabitants of each town constitute a little democracy, and by associating together, virtually pledge themselves to be gov-

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do? What part of the name was dropped? When? When was the first constitution formed?—when devised?—when adopted in its present form? What has since been done? What the most important amendment? What part of Vt. granted be-

erned by the will of the majority. They meet together, and by vote adopt rules, and appoint officers to execute the will of the people. This process of town organization is the first step in the establishment of civil government.

9. *Town Officers.* The principal officers which our present town organizations require, are a Town Clerk, whose duty it is to record the proceedings of the town meetings, and all the public documents of the town: three Select men, who shall lay out highways, assess the taxes in accordance with a vote of the town or state, and superintend the general interests of the town: three Listers, who shall appraise property, and make out the grand list; a Constable, to collect the taxes; a Treasurer, to receive and pay out the public money: an Overseer of the poor: Superintendents of Schools, and some others. All these are elected annually, in the month of March, and hold their offices for one year.

10. *Freemen's Meeting.* The Constitution of the state, having been formed by delegates from the organized towns, and ratified by the people, is the supreme law of the land. In accordance with the provisions of this instrument, a meeting of the freemen in each town is held on the first Tuesday of September, for the election of state officers. The officers voted for at this meeting are: Governor, Lieutenant Governor, Treasurer, County Senators and Town Representatives, and, as occasion requires, Representatives in Congress and electors of President and Vice President. To be entitled to vote in Freemen's Meeting, a person must be a citizen of the United States, must be 21 years of age, must have resided in Vermont one whole year next preceding the meeting, and must have taken the oath of allegiance to the state; and to vote for town representatives he

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fore its government was organized? By whom was the remainder granted? What is said of the Vt. charters?—what reservations? Where does political power originate? What do the people of each town constitute? What the process of

must have resided in the town three months next preceeding the election.

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## II. DEPARTMENTS OF GOVERNMENT.

The government of the State of Vermont consists of three separate departments, the Legislative, the Executive, and the Judiciary.

1. *Legislative Power.* The supreme legislative power is exercised by a Senate and House of Representatives, which, together, are stiled The General Assembly of the State of Vermont. The senators and representatives are chosen annually on the first Tuesday in September, and meet in general assemply on the second Thursday in October following.

2. The *Senate* consists of 30 members, chosen by counties and at present appointed as follows, to wit: Addison, 2; Bennington, 2; Caledonia, 2; Chittenden, 2; Essex, 1; Franklin, 3; Grand Isle, 1; Lamoille, 1; Orange, 3; Orleans, 1; Rutland, 3; Washington, 2; Windham, 3; Windsor, 4.

To be a senator a person must be 30 years of age, and must be a freeman of the county in which he is elected. Senators are elected by plurality of votes.

The Lieutenant Governor is president of the senate *ex-officio*, but can give only a casting vote, when the senate is equally divided; and they elect their own secretary. The senate has power to decide on the election and qualification of its members, and a majority of the senators constitutes a quorum. The senate may originate resolutions and bills of all kinds, excepting for

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organization? Name the principal town officers and their duties? When elected? What is said of the constitution? For what does it provide? What officers are then voted for? what is necessary to entitle a person to vote in freemen's meeting? Of what departments does the government consist? In what is the legislative power vested? What are they styled? When chosen? When do they meet?

revenue, which last must always originate in the house of representatives; and their concurrence is necessary for the passage of all bills and resolutions, which originate in the house of representatives. The senate have the sole power of trying and deciding all impeachments.

3. *The House of Representatives* consists of one member from each organized town, to be chosen annually by the freemen of the town, on the first Tuesday in September, and the constitution requires that they be *persons most noted for wisdom and virtue*. A majority of the representatives chosen, constitutes a quorum for transacting all business excepting the raising of a state tax, and that requires the presence of two-thirds. The representatives have power to elect a speaker, clerk and other officers of the house, and to judge of the elections and qualifications of their own members. They can also originate and prepare bills, and, with the concurrence of the senate, enact them into laws. But they shall have no power to add to, alter, abolish, or infringe any part of the constitution of the state.

For the election of general state officers, excepting the Governor, Lieutenant Governor and Treasurer, who are chosen by the people, the senate and representatives meet in *joint assembly*, at which meeting the presiding officer of the senate shall preside. The permanent state officers elected by the joint assembly are, a secretary of state, auditor of accounts, judges of the supreme, the county, and the probate courts, a sheriff and state's attorney for each county, and justices of the peace for each town. When there is no choice of governor, by the freemen, the joint assembly shall elect for governor, one of the three candidates for whom the greatest number of votes shall have been returned.

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How many Senators? How appointed? Qualifications? How elected? What is said of the lieutenant governor? What is meant by *ex-officio*? What are the powers of the Senate? Of what does the house of representatives consist? When chosen? What qualifications required? How many a quorum? What their powers? What constitute the joint assembly? What state officers are

They may also elect major and brigadier generals of militia, as vacancies occur.

4. *Executive Power.* The supreme executive power of the state is vested in the governor, or, in case of his absence, or disability, in the lieutenant-governor. It is the duty of the governor to commission all officers, to correspond with other States, to transact business with the officers of government, and to lay before the general assembly such matters as, he may think, require their attention. He may appoint a secretary of civil and military affairs, whose services he may at all times command, and, for the payment of whose salary, provision shall be made by law.

5. *Judiciary Power.* The judiciary power of the State is exercised by a supreme court and court of chancery, a county court in each county, justices of the peace in each town, and a probate court in each probate district.

6. *The Supreme Court* consists of one chief judge and five assistant judges, any three of whom constitute a quorum. This court holds one session annually in each county. The judges of the supreme court are justices of the peace throughout the State.

Each judge of the supreme court is a *chancellor*, and, within his judicial circuit, possesses, and may exercise all the jurisdiction and powers, which now are, or hereafter may be, vested in a court of chancery.

7. *The County Court* consists of one of the judges of the supreme court, who acts as chief judge, and two assistant-judges in each county.

Each county court, within the several counties, has original and exclusive jurisdiction of all original civil and criminal actions, except such as are made cognizable by a justice of the peace, and has appellate jurisdiction in all causes appealable to such court, and may render judgment according to law.

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chosen by the joint assembly? What is said of the executive power? What is the governor's duty? In what is the judiciary power vested? What is said of supreme court?—of a court of chancery? Of what does the county court con-

The judges of the county court appoint the superintendents of common schools for their respective counties; and also grant licences for the sale of ardent spirits.

8. *Justices of the Peace* within their respective jurisdictions have power to try and determine all actions of a criminal nature, which are punishable by fine, not exceeding ten dollars; and to commit to prison, or to bind over for trial, by the county court, all offenders, whose crimes exceed their powers to try. They have original and exclusive jurisdiction in all civil causes, where the matter in demand does not exceed \$100, except in actions for slanderous words, false imprisonment, replevin above the sum of \$7, and where the title of land is concerned. They also have jurisdiction in actions of trespass, where the sum in demand does not exceed \$20.

*Probate Courts.*—For the settlement of the estates of deceased persons, the state is divided into 20 probate districts, and a probate court established in each. Each of the six southern counties in the state, is, at present divided into two probate districts; and each of the eight northern counties constitutes one probate district.

The probate court consists of one judge in each district, who is authorized to appoint a register of said court, whom he may remove at pleasure. Probate courts are required to be held in each district as often as once in each month.

All matters originally within the jurisdiction of the probate court, may be carried to the county court by appeal, and from that to the supreme court, for the decision of questions of law.

The judiciary powers of the state are, at present, exercised by *six* supreme court judges, *twenty-eight*

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sist? What its jurisdiction? What the jurisdiction of justices of the peace in criminal actions?—in civil causes?—trespass? What are probate courts for? How many probate districts? How districated? Of what does this court consist? How often held? By what are the judiciary powers of the state now exercised?

county judges, *twenty* judges of probate, and near *three thousand* justices of the peace, all of whom are chosen annually by the general assembly.

10. *Council of Censors.* One of the most striking peculiarities in the Constitution of Vermont, is its provision for the election of a *council of censors*. This council consists of thirteen persons chosen, once in seven years, on the last Wednesday in March; and they may exercise the powers given them by the constitution, during the period of one year, from the day of their election. They are required to hold their first meeting, on the first Wednesday in June, next after their election.

The business of this council, is to enquire,

1. Whether the constitution has been preserved inviolate.

2. Whether the branches of government have confined themselves to the due exercise of their powers for the good of the people.

3. Whether the laws have been faithfully executed, the taxes justly laid, and the revenue legally expended.

4. They shall have authority to pass public censures, to order impeachments, and to recommend the repeal of such laws, as appear to them to have been passed, contrary to the principles of the constitution.

5. They may recommend amendments to the constitution, and they may call a convention for the discussion, and the adoption or rejection, of the amendments proposed.

Although the successive councils had frequently proposed amendments to the constitution, and had called conventions for their consideration, no amendment was adopted, till 1828, when *one* of the articles proposed by the council elected in 1827, and which related to the naturalization of foreigners, was adopted. By this ar-

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How are they chosen? What is peculiar in the constitution of Vt. what is said of this council? When must they meet? What their first inquiry?—second?—third? What their authority? What may they recommend? Where was the first amendment made? What its object? How long must a foreigner reside



ticle, foreigners are required to become naturalized, in accordance with the laws of the United States, which require a residence, of at least five years in the country. In 1836, a series of amendments, proposed by the council elected in 1834, was adopted, by which a senate was constituted as a co-ordinate branch of the legislature, and the old advisory council was abolished.

The above embrace all the amendments to the constitution, since its adoption, in 1793.

11. *Laws and Punishments.* The business of legislation was commenced in Vermont, in 1778, but of the laws passed that year, no record is preserved. They are understood to have been general enactments, such as *declaring the laws "as they stand in the Connecticut Law book,"* or, in defect of those laws, *the plain word of God, as contained in the Scriptures,* to be the law of the land, till the legislature should have time to digest, and enact a code adapted to the circumstances of the country.

The first code of printed laws, was enacted in 1779. These were promulgated, by a proclamation of governor Chittenden, commanding the people "to take notice thereof, and govern themselves accordingly." These laws, although many of their provisions have been swept away by subsequent enactments, form the basis of the present statute laws of the state.

Since 1779, the acts of the general assembly, have been published in pamphlet form, at the close of each session.

Revisions and compilations of the unrepealed laws, of the State, have been made from time to time; the last of which was made in 1839, and the revised statutes published in 1840.

here before he can be naturalized? What amendment in 1836? What their effect? When was legislation commenced? What is understood respecting the first laws? When the first printed laws? How promulgated? Of what are they the basis? What has been done since 1779? Have the laws been revised? When last? What is said of the penal laws? What change? For what has

The penal laws in Vermont, have undergone a great change since the first code was promulgated. The barbarous practice of whipping, branding and the pillory as punishment for crime, have been exchanged for imprisonment at hard labor in the state prison.

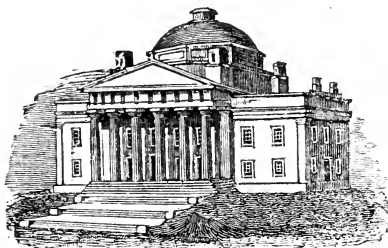
Murder is the only crime for which capital punishment has been inflicted since the organization of the government. Few executions have taken place. The first was that of Cyrus B. Dean, at Burlington in 1808; the second, Samuel E. Godfrey, at Woodstock in 1818; the third, Virginia, at St. Albans, in 1820, and the fourth, Archibald Bates at Bennington in 1839. A Mr. Anthony at Rutland, and a Mrs. Peak at Chelsea, died in prison while under sentence of death. David Redding, was executed at Bennington, for "enemical conduct" before the organization of the state government.

13. *State Prison*.—In 1807 an act was passed providing for the erection of a state prison at Windsor and during the two following years the buildings were nearly completed. The first commitments were made in 1809, and the average annual number of commitments since that time has been about 34, and the average time for which they were sentenced about 4 years. The prisoners have been employed in various kinds of work, but the avails of their labors have hitherto fallen far short of the expenses of the prison.

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capital punishment been inflicted? What executions have taken place? When was the state prison built? When the first commitment? The average number? What is said of the avails of the labor?

## III. STATE INSTITUTIONS.

*State House.*

1. *State House.* At the time Montpelier became the capital of the State, the inhabitants of that town, and vicinity, erected a state house, and gave it to the state; and the first session of the legislature, was held in it, in 1808. This building was of wood, and having, at length, become inconvenient, and, having gone somewhat to decay, it was resolved, in, 1831, to erect a new one.

The building of the new state house, was commenced, in 1833, under the superintendence of Ami B. Young Esq. as architect, and in 1836, was so far advanced towards completion, as to be occupied by the legislature. The entire building and yards, were finished in 1838, making a period of  $5\frac{1}{2}$  years, for the time of its erection.

It was built, entirely of granite, is in the form of a cross, and is 150 feet long, and 100 feet deep, in the centre. The central part is 72 feet broad, and each of the wings 39 feet. The wings are 36 feet high, and the

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Of what class the Vt. flag consent? What the essentials in the coat of arms? When the first statehouse built? When was a new one commenced? Who was the architect? When finished? How long in building? What its form?—length?—depth?—its front?—height?—What is said of the erection?—cost?—Of whom

height of the dome is 100 feet. The interior is occupied by the representatives' hall, senate chamber, library, and a large number of public rooms, and offices. The whole cost was \$132,077, of which sum the town of Montpelier paid \$15,000.

2. *Militia.* The militia of Vermont, consists of all the able bodied men, with a few exceptions, between the ages of 18 and 45 years. Previous to 1844, the whole militia was organized in companies, regiments and brigades, and each company was required to be called out for inspection, drill and discipline once, at least, in each year, on the first Tuesday in June. In 1844, the organization of companies was abolished, and the listers in the respective towns were required to enroll all persons liable to do military duty.

Within the bounds of each regiment, six uniform companies, not exceeding 100 men each, may be organized and meet for review and drill, and when the public service shall require a force exceeding that of the uniform companies, it shall be supplied by the organization of companies from the enrolled militia.

The whole militia of the state is now comprehended in *three* divisions, *nine* brigades and *twenty-eight* regiments. All the general, field and staff officers are considered as belonging to the uniform militia, while the enrolled militia remains unorganized into companies.

3. *Flag of Vermont.* The flag, or banner, of Vermont, as established by law, consists of thirteen stripes, alternate red and white, and the union, one large star, white in a blue field, with the coat of arms of the state therein.

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does the militia of Vt. consist? How organized previous to 1844? What was then done? What is said of uniform companies? How may a greater force be had?—How many divisions of militia?—brigades?—regiments? To what do the general officers belong? Of what does the flag of Vermont consist? What

(22)

4. *Coat of Arms.* The device usually embraced in the coat of arms of the state, consists of mountains, an evergreen, kine, a plough and sheaves of grain.



Coats of arms are devices upon seals, badges and banners, which are employed as marks of distinction. In Europe, where the orders of nobility are kept up, the subject of armorial bearings has become a science under the name of *heraldry*. In this country, where we have no orders of nobility, family distinctions have ceased to be represented by heraldic devices; but the general government, and the several states of the Union continue to employ them on their banners and public seals. The emblem adopted by the United States is an eagle, bearing a bundle of arrows in one claw and an olive branch in the other, with the addition of stars, and 13 stripes, alternate red and white, on their flag.

(23)

5. *Banks.* The first paper currency was issued in bills of credit, 'for the carrying on of the war, paying the State debts, and increasing the circulating medium.' These bills were all faithfully redeemed by the State. A fac simile of a whole bill may be seen in Thompson's Vt. Part II., p. 134. Fig. 23 is a *fac simile* of the devise upon the face of these bills.



The first bank was a State bank, established in 1806. It consisted of four branches, viz.: one at Burlington, one at Woodstock, one at Middlebury, and one at West-

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the device of the coat of arms? What is meant by coats of arms? What is said of Europe? How is it in this country?—What was the first issue of paper money in Vt.?—Was it all redeemed?—When was the first Bank established?—Of how many branches did it consist?—Did it answer expectation?—When was the

minster. This bank failed to answer the expectations of the founders, and, after a few years, its business was brought to a close, and its bills were gradually redeemed through the State treasury.

In 1818, the present Bank of Burlington was incorporated, and since that period banks have been established in various parts of the State. The present number of banks of discount and deposit in the State is nineteen; and there are eight *savings banks*.

6. *Revenue*. The revenue of Vermont is derived almost entirely from direct taxation. For the purpose of assessing the taxes there is an appraisal of all the ratable property in the State, and one per cent. of this appraisal is set in the list. To this are added the polls at \$2 each, and certain assessments of attorneys, physicians, &c., and the whole constitutes the *Grand List* upon which State, county, and town taxes are assessed.

In the appraisals which are made by the listers, all public property is exempted—also, household furniture not exceeding \$500—wearing apparel—libraries and tools.

The whole Grand List of the State amounted, in 1847, to \$784,437. This being only one per cent. on the appraisal of the property, the whole amount of taxable property in the State, (including polls and assessments of faculty as such) will be one hundred times the grand list, or \$78,443,700.

7. *Salaries*. The salaries attached to the several permanent offices of the State are generally small. The following are the principal:—

Governor's salary,	-	-	-	-	\$750
Judges of the Supreme Court, (each)					1375
Treasurer,	-	-	-	-	400

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first of the present banks established?—How many banks of discount now?—How many savings banks?—From what is the revenue of Vt. derived?—Upon what are the taxes assessed?—How is the grand list made?—What property exempted?—What the whole list of the State?—The amount of taxable property?—What is said of salaries?—What salary does the governor receive?—The judge of the su-

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Secretary of State,	-	-	-	-	275
Secretary of the Senate,	-	-	-	-	250
Clerk of the House of Representatives,					275
Secretary to the Governor,	-	-	-	-	200
Engrossing Clerk,	-	-	-	-	150
Assisting Secretary of the Senate,	-	-	-	-	125
Assisting Clerk of the House,	-	-	-	-	125
State Librarian,	-	-	-	-	100
Superintendent of State Prison,	-	-	-	-	500

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The President of the Senate receives *four* dollars per day, the speaker of the House *three* dollars, and the Senators and Representatives *one and a half* dollar per day, while attending the general assembly; and they receive for travel each way *ten* cents per mile.

8. *Lotteries.* The practice of raising money by lotteries for specific objects was, in early times, legalized by the legislatures of most of the states in the Union; and Vermont, although she did not indulge largely in this species of gambling, adopted it a while as a method of dispensing charity and promoting good objects. Up to 1804 the whole number of lotteries authorized was 24. As early as 1800 a very considerable change had taken place in the public sentiment with regard to the propriety of raising money by lotteries, and only one lottery was authorized after that period.

After the legislature ceased to authorize lotteries within the State, the sale of foreign lottery tickets became so general here, that, in 1826, a law was passed prohibiting the sale of lottery tickets without a licence, and imposing a duty of \$500 for a licence to sell tickets for one year. The penalty for selling without a license was fixed at \$1000. The next year the cost of a licence was raised to \$1000 and the penalty to \$2000.

By the present laws of the State, lotteries of all kinds,

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preme court?—the treasurer? &c. What pay has the president of the senate?—the speaker?—senators? &c.—What is said of lotteries?—Were lotteries authorized in Vt.? How many? When did public sentiment change on the subject?—What laws were passed respecting the sale of tickets? What the present laws?

and the sale of lottery tickets, are prohibited by severe penalties.

9. *Post Offices.* The first post office was established at Bennington in 1783, with a weekly post between that place and Albany, N. Y. In 1784 additional post offices were established at Rutland, Brattleborough, Windsor and Newbury. These were established by the authority of the State, and Anthony Haswell, Esq., was post-master-general.

When Vermont was admitted into the Union, in 1791, the post offices here come under the control of the general government, and since that time they have been multiplied till almost every neighborhood has its post-office, and the greater part of the offices, daily mails.

10. *Telegraph.* In addition to the post-office communication there is a line of magnetic telegraph extending from south to north through the whole length of the state, near its western border. This places the villages through which it passes in momentary communication with all the principal cities in the United States and Canada. The communication by telegraph, between Burlington and Troy, N. Y., was opened on the 2d of Feb. 1848, and between Burlington and Montreal, C. E., shortly afterwards.

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When were post offices first established in Vt.? Who was post master general?—What was done in 1791? What has since been done? What telegraphic communication has been established? When?





#### IV. THE PEOPLE AND THEIR EMPLOYMENTS.

1. *Aborigines.* The territory of Vermont appears never to have been very thickly inhabited by Indians. The vallies of Connecticut river and lake Champlain, were thoroughfares through which they made their excursions to the northward and southward, and, at times, small bands had their residence on the margins of those waters.

The Indians, who resided along the upper parts of the Connecticut, were a branch of the Abeniqui, or St. Francis tribe. Their chief residence, was where the town of Newbury now is, and was called by them *Coos*, which, in their language, signifies the *pin*es. They were sometimes called *Coosucks*, that is, the Pineriver Indians, *suck*, in their tongue signifying river. Capt. Joe, from whom Joe's pond and Joe's brook, derived

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Was Vt. ever thickly inhabited by Indians? What were thoroughfares? What Indians resided on the Connecticut? What was the place called?—the meaning of the names? What is said of Capt. Joe?

their name, and who died at Newbury, in 1819, aged about 80 years, was the last of his tribe, who resided in Vermont.

The territory about lake Champlain, was claimed by several tribes, and was not only a favorite hunting ground, but also the scene of many of their bloody battles. Previous to the conquest of Canada by the British, the St. Francis Indians, had a village of 50 huts, with a church and Jesuit Missionary, at Swanton falls, in Franklin county. The Iroquois Indians claimed the southern part of the lake.

2. *Indian Relics.* These consist of pots, or urns, mortars and pestles, axes, chissels, gouges, spear and arrow points, and other implements, the use of which is not known. Arrow and spear points are very common, especially in the neighborhood of lake Champlain, and on the islands in the lake. The following figures exhibit the forms of some of these relics.

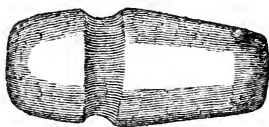
*Urn.* Fig. 25, is the figure of an urn, found in Colchester, in 1825. It was found in the earth, covered by a stone, over which a large tree had grown. It is a very good specimen of unglazed pottery, and will hold about one gallon.

(25)



(26)

*Axe.* Fig. 26. The axes vary from half a pound to five or six pounds.



(27)

*Gouge.* Fig. 27.

The gouges are sometimes grooved through the whole length, which is generally from eight to twelve inches.



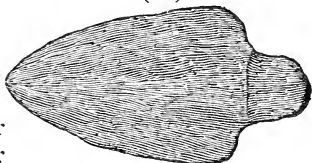
(28)

*Arrow points.* Fig. 28. The arrow pt's. are from one to five inches long.



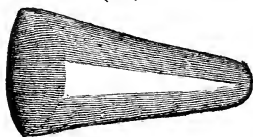
(29)

*Spear points.* Fig. 29. The spear points are from four to eight inches long, and two or three inches wide. The arrow and spear points are usually jasper, or brown quartz.



(30)

*Chissel.* Fig. 30. The chissels vary much in size and form, but are usually from six to twelve inches in length.



(31)

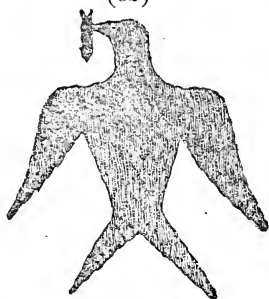
Fig. 31 was found in Burlington, is ten inches long, neatly carved out of a gray stone, but its use is not known.



What is said of gouges?—arrow points?—spear points?—chissels?

(32)

3. *Indian hieroglyphics.* The only things of this kind, which have attracted any notice, are upon a rock at the side of a cove near the mouth of West river in Brattleborough. and are little more than rude scratches representing birds and some other animals.—Whether these figures are real hieroglyphics, or were made by the rude natives merely for amusement, while fishing, or watching for water fowl at this place, is unknown. To give the reader an idea of what these figures are, we have procured a copy of one which evidently represents a fish hawk bearing off his prey, as will be [seen by the cut, Fig. 32.



4. *Population.* The first complete census of Vermont, was made in 1791, when the population was found to be 85,539. The population as ascertained at that, and the subsequent enumerations, was as follows ;

1791—85,539.	1820—235,749.
1800—154,465.	1830—280,715.
1810—217,204.	1840—291,948.

Of the 291,948, persons in Vermont, in 1840 ; 146,712 were males, and 145,206, were females. These numbers include 730 colored persons, 361 of whom were males, and 366 females.

There were at that time, 137 persons who were deaf and dumb, 103 who were blind, and 402, who were insane, or idiots.

The number of pensioners for revolutionary, or military service, was 1320.]

The number of persons employed in agriculture, was

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When was the first complete census of Vt. ?—What the population ?—What in 1810 ?—How many were males ?—females ?—colored ?—How many deaf and dumb ?—blind ?—insane ?—pensioners ?—employed in agriculture ?—commerce ?—manu-

73,150, in commerce 1303, in manufactures and trades, 13,174, and in the learned professions 1563.

The number of white persons above 20 years of age who could not read and write, was 2270, or one to 124, and these were nearly all foreigners.

The population of the state by counties has been given in the table on page 89. The population by towns. will be found in part third.

5. *Agriculture.* Agriculture is the principal employment of the people of Vermont. While suitable numbers are devoted to the various trades and professions, the great mass of the population is engaged in cultivating the earth, and it is pleasing to notice the gradual improvement, which has been going on in agriculture, both as an art and science; and more especially the advance which it has made, within a few years past, in the public estimation.

The soil of Vermont, generally, is of an excellent quality and seldom fails richly to repay the labors of the husbandman. The uneven tracts, which cannot conveniently be ploughed, furnish the best of pasturage for cattle and sheep. The most important crops which are taken from the soil are hay, Indian corn, potatoes and oats. Considerable quantities of wheat are raised, but not enough to prevent the introduction of western flour.

The most important staple for market is wool. Beef, pork, butter, cheese, &c., are furnished in considerable quantities,

The following is an abstract of the agricultural productions in 1840.

Wheat, bush.	495,800	Cocoons, lbs.	4 280
Rye do	230,993	Wax, lbs.	4 660
Corn do	1,119,678	Product Dairy	\$2,008,737
Oats do	2,222,584	do Orchard	213,944

factures?—unable to read?—What is said of them?—What is the chief employment?—What improvement has taken place?—What is said of the soil?—What the most important crops?—exports?—What act was passed in 1841?—What has

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Buckwheat do	228,416	do Garden	15,276
Barley do	51,781	do Nurseries, etc.	5,600
Potatoes do	3,869,751	Horses	62,402
Hay, tons,	869,739	Neat Cattle	384,341
Hops, lbs.	48,137	Sheep	1,681,819
Tobacco, lbs.	585	Swine	203,809
Flax, lbs.	59,000	Poultry, value	\$131,578
Wine, gallons	94	Lumber	\$346,939
Wool, lbs.	3,699,235	Other prod. forest	2,500

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In 1843 an act was passed to promote the improvement of agriculture, manufactures and the arts; and to encourage the formation of county societies for these objects, the societies were authorized to draw certain sums from the state treasury, to be distributed in premiums, provided the society should raise by subscription, an equal sum for that object. In accordance with this enactment societies have been formed in most of the counties and annual fairs are held, which evince considerable zeal and success in the good cause in which the societies are engaged.

6. *Manufactures.* The manufactures carried on in Vermont were, for many years, such only as the immediate wants of the people rendered indispensable, and in general each family were their own manufacturers. With scarcely any tools but an axe, the first settlers entered the forests, cleared off the timber from a small piece of ground, cut down trees to a suitable length and by the help of a few neighbors, reared their log houses and covered them with bark. These afforded shelters for their families, and by persevering industry, they were soon enabled to raise a little flax and wool, which were spun and wove and colored and made into clothing by the females for home and Sunday wear; and we have no doubt that, at that period, the swains in their tow, or checked woolen shirts and kersey frocks and trowsers, and the girls in their tow and

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been done in accordance with it?—What is said of manufactures?—With what the first settlers enter the forests?—What did they do?—What is said of their cloth-

linen or flannel gowns and checked aprons, were as happy, yea, and perhaps as proud too, as the moderns in their broadcloths, and silks, and muslins. The only trades which were then deemed indispensable, were those of the blacksmith and the shoemaker, and these were, for the most part, carried on by persons who labored a portion of their time upon their farms.

As the condition of the people improved, they, by degrees, extended their desires beyond the mere necessities of life; first to its conveniences, and then to its elegancies. This produced new wants and; to supply these, mechanics more numerous and more skilful were required, till at length the cabinet-maker, the tailor, the jeweller, the milliner and a host of others came to be regarded as indispensable.

In addition to the various articles and fabrics for domestic use, Vermont possesses facilities for manufactories on an extensive scale. The water power is unlimited, wood for fuel is abundant, and there is no lack of the raw materials for manufactures of wool, iron, wood and stone; and since the difficulties of transportation, which have hitherto been the chief obstacles in the way of the establishment of manufactories is about being overcome by the construction of rail roads, we may hope soon to see our water power more generally employed, and our energies and resources more fully developed.

By the returns of the census of 1840, there were at that time in the state

26 Furnaces	7 Cotton Factories
14 Forges	271 Tanneries
17 Paper Mills	2 Glass Factories
26 Woolen Factories	319 Gristmill
239 Fulling Mills	1081 Saw Mills

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ing? What trades were indispensable?—In what manner was the number increased?—What facilities for manufacturing has Vt.?—What raw materials? What obstacle is being overcome?—How many furnaces in 1810? &c.

The amount of maple sugar made in 1840 is stated at 4,647,934 pounds.

The articles manufactured in Vermont are mostly used here, with the exception of paper and woollen cloths.

7. *Commerce.* Commerce is the business of buying and selling, or the exchange of commodities. The persons by whom this business is transacted are called merchants, or traders.

Vermont has little foreign commerce. Her trade is nearly all domestic, or internal. It is *domestic* when carried on with the sister States, and *internal* when carried on between citizens of our own state.

All trade is carried on either by barter or sale: *barter* consists in giving or exchanging one article for another. It formerly prevailed very generally in this state, much more so than at present.

*Sale* is the exchange of the article sold for a sum of money, called the price.

*Money* is either specie, or paper money.

*Specie* is coin composed of metal, usually gold or silver, which is stamped, and has a legal value. The place where coin is stamped is called a *mint*.

*Paper money* consists of bank bills, which are promissory notes issued by a bank, entitling the holders to the sum in specie, which is stated on the face of the note, whenever demanded at the bank.

On account of the inland situation of Vermont, and the various modes of transportation, it is impossible to form any correct estimation of the amount of trade. The commercial business of the State is, however, considerable, and is annually increasing. A large amount of dry goods and groceries is brought into the state and disposed of among the inhabitants; and for several years past Vermont has, to a very great extent, de-

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How much sugar was made?—What is done with the articles made? What is commerce? What is said of the commerce of Vt.? When domestic?—when internal? How is trade carried on? What is said of barter? What is



pended upon the state of New York and the western states for her bread stuffs.

The productions for market consist of live cattle, horses, hogs, sheep, wool, lumber, pot and pearl ashes, butter, cheese, iron, marble, paper, copperas, &c. Wheat was formerly furnished, but for some years past a sufficient quantity has not been raised for home consumption. When the country was new and the first settlers were clearing their lands, pot and pearl ashes were the staple articles for market. Lumbering also engaged the attention of many in the vicinity of the navigable waters. Connecticut river furnished an outlet for the lumber in the eastern part of the State, while that in the western part found its way to Quebec through lake Champlain, the Richelieu and St. Lawrence, previous to the construction of the Champlain and Hudson canal, since which much has gone through that canal to New York. But this branch of business has been pursued too eagerly for the good of the State. Pine of a good quality has become scarce for domestic purposes. For about sixteen years past wool has constituted the principal article for market; and is so at present, although a large amount of the other articles above named continue to be sent away.

Vermont being an inland state its navigation is necessarily limited. Indeed it is nearly confined to lake Champlain. A portion of the merchandise and the productions of the eastern parts of the state, it is true, are transported in boats upon Connecticut river, but far the greater portion of the business of those parts has been over-land to Boston, and will continue to be so, by means of the rail roads now finished. The mercantile connexions on the west side of the mountains have been mostly with New York, and most of the business of the north-western section of the state has been

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sale? Money?—Specie?—Paper Money? Amount of trade? What the exports? Staple articles? Outlets for lumber? What is said of lumber?—of wood?—of navigation?—mercantile connexions?—effect of rail roads?—shipping

transacted through lake Champlain, the northern canal and Hudson river. But the completion of the rail roads leading to Boston, will probably divert a portion of it in that direction.

The *navigation* on lake Champlain, is principally by steamboats, sloops and canal boats. The first steamboat on the lake was completed in 1809, and was called the *Vermont*. The whole number, which has been built, is twenty.

There are now four splendid boats, which form a day and night line, both ways, thro' the length of the lake.

It is remarkable that in the forty years of steam navigation upon this lake, only one serious accident has occurred, and that was the burning of the steamboat, *Phoenix*, on the fifth of September, 1819, by which six or seven persons lost their lives.

For the safety of the navigation of the lake, a light house was built upon Juniper Island in this state, in 1826, and since that period two others have been erected on the New York side, one at Cumberland Head, and the other at Split Rock. A breakwater has been erected at Burlington, for the protection of the shipping at the wharves. The light houses and breakwater, were erected at the expense of the United States government.

8. *Rail Roads*. There are at present three principal rail roads which have been located, and, in part, constructed in this state.

The *Central Rail Road* extends from Burlington to Windsor, a distance of 117, miles, and there connects with a road through Fitchburgh to Boston. The distance from Burlington to Boston, through this line is 254 miles. At Hartford, 103 miles from Burlington, this line connects with the road to Boston, through Concord

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on lake Champlain? When was the first steamboat completed? What called? What the whole number? What lines mentioned? What is remarkable? What the accident? What light houses?—breakwater?—at whose expense? What the extent of the Central Rail Road? Through what roads does it communicate with

and Lowell. The whole distance from Burlington to Boston this way is 247 miles. This road was opened from Hartford to Bethel, and the first cars commenced running in this state, June 26, 1848. It is now, (October 20, 1848,) finished from Hartford to Northfield, and the cars run regularly from the latter place to Boston, by way of Concord.

The *Rutland and Burlington Rail Road*, called also the *Southern Rail Road*, extends from Burlington to Bellows Falls, through Rutland, a distance of one hundred and eighteen miles, and there connects with the road through Fitchburgh to Boston. The distance from Burlington to Boston through this line is two hundred and thirty-one miles. The grading of this line is mostly finished, and it will probably be completed in readiness for the cars in the course of the year 1849.

The *Passumpsic Rail Road*, connects with the Central at Hartford, and extends north through Newbury towards Derby. It is located as far as Wells river, and finished, and the cars upon it, as far as Bradford.

Several other rail roads have been granted within the state, which will probably be constructed in the course of a few years.

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## PUBLIC INSTRUCTION.

A few months attendance at primary schools, as they existed in New England, before the revolution, was the whole amount of education, which the early settlers of Vermont, generally, enjoyed. But these advantages had been so well improved that nearly all of them were

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Boston? What the distance each way? When and where did the cars first run in Vermont? How far finished in Oct. 1848? What the extent of the southern Rail Road? What its condition? What is said of the Passumpsic Rail Road? What is said of the education of the first settlers of Vt.?

able to read, write and keep accounts. They were in general, men of strong minds; and, clearly perceiving the advantages, which education confers, they early directed their attention to the establishment of schools and seminaries of learning.

1. *Primary Schools.* The first general law on the subject of schools was passed on the 22d of October 1782. This law provided for the division of the towns in this state into convenient school districts, and for the appointment of trustees in each town for the general superintendence of the schools.

It also provided for the election of a prudential committee by the inhabitants of each district. This committee was authorized to raise the money required to build, and keep in repair, a school house, and support a school, by a tax on the people of the district, one half of it to be assessed on the grand list, and the other half, either on the list, or on the polls of the scholars, as should be ordered by a vote of the district.

By the same act the judges of the county courts were authorized to appoint trustees of a county grammar school, in each of their respective counties; and, with the assistance of the justices of the peace, they were authorized to assess a tax on the county for the purpose of erecting a suitable building for a county school house.

That part of the above provision, which relates to county schools, seems never to have been carried into effect, but so much of it as relates to town schools was generally introduced, and now forms the basis of our common school system.

Our present statutes require that all the organized towns in the state shall be divided into school districts of convenient size, and that a school be maintained during a portion of the year in each; and the select men

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When was the first general school law passed? What were the provisions of this law? How could money be raised? What provision for country schools? Was this carried into effect? What do our present statutes require?

of each town are required annually to assess a tax of *three cents* on a dollar of the grand list of the town for the support of schools in the same.

One fourth of the money raised by the tax above mentioned, together with one fourth of the avails of the deposit money, is required to be divided equally, on the 1st. of March, among the school districts, without regard to the number of children in each. The remaining three-fourths is to be divided among the districts, in proportion to the number of children they contain between the ages of four and eighteen years; provided that no district shall be entitled to share in such money, which has not, during the preceding year, kept a school at least two months, with other moneys than those drawn from the town treasury, nor unless the moneys so drawn, shall have been faithfully expended. The several school districts have the powers of a corporation, and are authorized to raise money within the same, for the support of schools, either upon the grand list, or upon the polls of the scholars.

The present provisions for the superintendence and improvement of primary schools were made by an act of the legislature, passed November 5, 1845. This act provides—

1st. That there shall be one or more superintendents of common schools, not exceeding three, in each town, to be appointed by the freemen thereof at their March meeting, annually.

2d. There shall be a county superintendent in each county, appointed by the judges of the county courts in the several counties, at the sessions of said courts next preceding the first day of October of each year.

3rd. That there shall be a state superintendent of

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What tax is assessed? How distributed? What the condition? When were the present provisions for superintendence of schools made? What the first?—the second?—the third? How appointed respectively?

common schools, who shall be annually appointed by the joint assembly.

The duty of town superintendents is to examine teachers for their respective towns, to give certificates to those whom they shall find qualified to teach, to visit all the common schools in their respective towns once at least every year, and exercise a general supervision over them.

The duty of the county superintendents is to examine teachers for their respective counties, to visit all the towns in the county once or more every year, to call conventions of teachers, deliver lectures, and advise and council with town superintendents, prudential committees and the teachers of schools, in regard to books, courses of instruction and government of the schools.

The county superintendents are required annually, on the first of September, to make reports to the state superintendent relative to the government, course of instruction, books, studies, discipline and conduct of the schools in their respective counties.

It is made the duty of the state superintendent to prepare and submit to the general assembly at the opening of each annual session thereof, a report containing a statement of the general condition of the schools of the state, together with such other matters and suggestions, as he may think will promote the general cause of public education.

The state superintendent receives an annual salary of \$200. The county superintendents are entitled to \$2 per day for their services; and the town superintendents \$1 per day.

Contracts between a teacher and a prudential committee for teaching a school, are null and void, unless the teacher obtain a certificate of qualifications before commencing the school.

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What the duty of town superintendents?—Of county do. ? What the duty of the state superintendent? What pay do the superintendents receive? What is said of contracts between teacher and committees?

The *deposit money*, mentioned in a preceding paragraph, was a portion of the avails of the public lands of the United States, which was distributed to the several states by act of congress in 1837. The amount distributed was \$28,101,645, and the share which fell to Vermont was \$669,087. This sum was distributed by act of the legislature, among the towns of the state in proportion to their population, and then loaned on good security; and the annual interest applied for the support of schools as already stated. The deposit money is regarded as a loan from the general government to the states.

In the school districts, generally, in this state, a male teacher is employed three or four months in the winter, and a female teacher about six months in the summer. The average wages for male teachers are about \$12,50 per month, and to female teachers, about \$5, per month.

The number of school districts in Vermont, as appears from the report of the state superintendent, is 2616, and the number of children between 4 and 18 years of age, about 100,000. This would give an average of about 37 scholars to a district.

2. *Academies.* About sixty county grammar schools, academies or high schools, have been incorporated in this state by special act of the legislature, since the organization of the government; but only a small part of these are now in existence. Our academies being generally without permanent funds, their very existence is dependent upon the popularity of teachers.

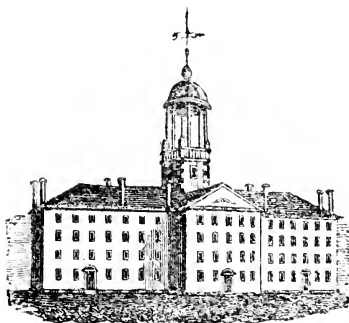
But under all our disadvantages we have at all times many flourishing academies and high schools in various parts of the state. In these are taught the higher branches of English studies, the mathematics and the ru-

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Explain what is meant by deposit money? What the length of schools?—average wages?—number of districts?—children?—average? What is said of academies?—what length in these?—what have several of them?

diments of the Latin and Greek languages. Students may here prepare for mercantile or other business, or to become teachers of primary schools ; or for admission into college, or the university.

Several of the academies in the north eastern part of the state, derive some aid from the avails of grammar school lands in the counties in which they are situated.



3. *University of Vermont.* In the townships chartered by the government of Vermont, one right of land was set apart for the endowment and support of a state university. These lands amounted in the whole to about 29,000 acres, and were scattered through about 120 townships and gores, mostly in the northern and central parts of the state.

On the 3d of November, 1791, an act was passed by the legislature, incorporating the university of Vermont, and locating it at Burlington. The first university edifice was erected in 1801, and cost about \$35,000, the greater part of which was contributed in Burling-

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What was set apart for the support of a university?—How many acres?—how situated?—When was the university chartered?—When located?—When was the first edifice erected?—describe it?—What became of it?—Who was the first president?—When the first commencement?—How was the present edifice erected?—Who laid the corner stone?—What do you know of La Fayette?—



ton and vicinity. It was 160 feet long, 75 deep in the centre and 45 on the wings, and four stories high. This fine building, a figure of which stands at the head of this article, was accidentally consumed by fire on the 27th of May, 1824.

The first president of the University was the Rev. Daniel C. Sanders, and the first commencement was held in 1804.

After the destruction of the first edifice, the present principal university building was erected in three parts and afterwards united into one. The corner stone of the first wing was laid by Gen. La Fayette, on the 29th of June, 1825. The whole building is 260 feet long, and three stories high.

The funds of the university are in lands, and amount to more than 40,000 acres.

The University library consists of about 8000 volumes, and is the most valuable library in the state.

The number of under graduates, has for several years past, averaged about 100. The faculty consists of a president and six professors.

The commencement is on the first Wednesday in August annually.

4. *Middlebury College.* Middlebury College was incorporated November 1st, 1800, and the Rev. Jeremiah Atwater, was constituted president by the act of the incorporation. A county grammar school had been established at Middlebury, in 1797, a spacious building erected in 1798, and a school commenced, of which the Rev. Mr. Atwater, was principal, at the time of the incorporation of the college. The college was, therefore immediately organized in the place of the grammar school, and seven students admitted to the collegiate course.

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What is said of funds?—library?—students?—faculty?—commencement?—When was Middlebury college incorporated?—Who was first president?—When organized?—Why so soon organized?—When the first commencement?—How many graduates in 1808?—What is said of the buildings?—of its endowment?—library?

The first commencement was held in 1802, when one student received the degree of bachelor of arts. But the number of students increased with great rapidity, and, in 1808, the graduating class numbered 23.

The present college buildings consist of three spacious edifices, one of wood, and two of stone. The latter are pleasantly situated on an eminence, which overlooks the village, and the adjacent country.

This college has received no endowments from the state, but has been sustained by private bounty, and the avails from tuition. It has received several large donations in lands and money.

Its library consists of about 3000 volumes, and its apparatus and laboratory are respectable.

The faculty consists of the president, four professors and one or two tutors.

The commencement is on the fourth Wednesday in July, annually.

5. *Norwich University.* In 1820 an institution was established at Norwich, in this state under the name of the *American Literary Scientific and Military Academy*, and a commodious building was erected for its accommodation. This institution, was under the superintendence of Capt. Alden Partridge, and continued for several years in a very flourishing condition, having pupils or cadets, from nearly all the states in the Union.

On the 6th of November, 1834, after a partial suspension of the original institution for sometime, an act was passed incorporating it by the name of the *Norwich University*, and Capt. Partridge became its first president.

The plan of this university is quite unlike most of our collegiate institutions. There is no definite time in which a regular course of studies is to be completed, and, consequently there is no general course, the sta-

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— commencement?—In what manner did Norwich university originate?—When incorporated?—Who was first president?—What is said of its plan?—When organized?—When the first commencement?—When were medical lectures first delivered at Castleton?—When was the school charter'd?—What was done in 1841?—How degrees conferred?—Who was the first president?—chief founder?—Who

ges of which are indicated by years. Each student is permitted to advance in his studies as rapidly as he is able, due regard being had to a thorough understanding of the same, and, when he has completed the full course marked out by the university, he is admitted to an examination, and to the honors of the institution, if found qualified, without regard to the time he has been pursuing his studies.

The university was organized under its charter in May 1835, and held its first commencement in 1836.

6. *Castleton Medical College.* Medical lectures were first delivered at Castleton in the spring of 1818. On the 29th of October following, a school was chartered here by the name of the *Castleton Medical Academy*. Shortly afterwards a medical faculty was organized, and with two exceptions, regular courses of Medical Lectures, have been delivered annually or semi-annually, ever since.

On the 22d of October 1841, the charter of the institution was amended, and its name altered by act of the legislature, to that of *Castleton Medical College*. The president and faculty have authority to confer medical degrees.

Dr. Selah Gridley was the first president of the institution, and he and Dr. Theodore Woodward were the chief founders of it.

7. *Vermont Medical College.* This institution is located at Woodstock, and owes its origin to the labors and efforts of Dr. Joseph A. Gallup. Medical lectures were commenced here in 1827, and the institution was called the *Clinical School of Medicine*.

In 1835 an act of incorporation was obtained, and the school took the name of *Vermont Medical College*. By this act it was placed under the care of a board of trustees, and power was given to confer medical degrees.

The first president under the charter was Dr. Henry H. Childs.

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the Vt. Medical College?—Who its founder?—What was it first called?—When incorporated?—the degrees conferred?—Who the first president?

8. *Printing.* The first *printing office* in this state was established at Westminster, in the summer of 1778, by J. P. Spooner, and T. Green.

The first *Newspaper*, was commenced at Westminster, in February, 1781, by Messrs. Spooner and Green. It was called the *Vermont Gazette, or Green Mountain Post Boy*, and its motto, which it is hoped will always truly characterize our state, was as follows:

"Pliant as reeds where streams of freedom glide;  
Firm as the hills to stem oppression's tide."

This paper was published weekly, on a sheet the size of our common writing paper, and was continued nearly two years.

The second Newspaper was commenced at Bennington, on the fifth of June 1783, by Anthony Haswell and David Russell. It was called the *Vermont Gazette, or Freeman's Depository*, and has continued, with some change, in the name, down to the present time.

The third paper was the *Vermont Journal*, commenced at Windsor, on the seventh of August, 1783.

9. *Réligion.* Christianity is clearly recognized in the constitution of Vermont, and in the subsequent acts of the Legislature, as the religion of the state and the Bible is recognized as embracing the principles and doctrines of Christianity, or the revealed will of God. Among the first transactions of the Legislature of the state, we find resolutions and laws relating to the due observance of the Lord's day as the Christian Sabbath.

But while Christianity is plainly admitted to be the religion of the state, and while the moral precepts of the Bible, are the acknowledged basis of legislative enactments, and while some kind of religious worship, regulated by the word of God, is enjoined upon all, government has wisely left the particular modes of

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When was the first printing office established?—the first newspaper printed?—what its name?—motto?—how long continued?—its size?—When and where the second?—the third?—What is the religion of the state?—How does this appear?—What is said of modes of worship and regulation of churches?—What

worship, and the internal regulation of churches to the judgment and consciences of individuals, provided they do not interfere with the right of others, or corrupt the morals and good order of society.

The principal religious denominations in the state, are congregationalists, methodists, baptists, episcopalians, freewill baptists, christians, universalists, roman catholics and unitarians.

10. *Congregationalists.* The Congregational church in Bennington, was the first church organization within the limits of Vermont, and the congregational church at Newbury was the second. The former was organized on the third of December 1762, and the latter in the fall of 1764. The whole number of congregational churches, which had been organized at the commencement of the revolution, was thirteen.

The congregational churches in the different sections of the state, are formed into associations, consociations and conferences.

The *associations* consist of ministers, who associate, adopt a constitution and by-laws, and hold meetings for mutual improvement.

The *consociations* consist of a pastor and one delegate, or two delegates where there is no pastor, from each church within their limits, who meet annually to hear reports on the state of religion and devise measures to promote the interests of the churches.

The *conferences* are organizations by counties in those parts of the state, in which consociations have not been formed, and their business and object are nearly the same as of the consociations.

Once each year there is a convention of delegates from the several associations, consociations and con-

are the principal denominations?—What was the first church formed in Vt. ?—second?—How many congregational churches before the revolution?—What organizations in the state?—What are the associations?—the consociations?—the conferences?—What convention?—How many churches?—ministers?—What

ferences, to adopt measures to promote the interests of religion and of the denomination.

There are in the state two hundred congregational churches, nearly two hundred ministers, and about twenty-three thousand communicants. *The Vermont Chronicle*, is the organ of this denomination in the state.

11. *Methodists*. The first methodist church in Vermont, was organized at Vershire in 1796. In the course of a year from that time, churches were organized in Barre and Barnard. In 1798, churches were formed on the west side of the mountains.

The present number of communicants in the methodist episcopal church in Vermont is about 17000, and their local and travelling ministers together number about two hundred and fifty.

This denomination have under their patronage and control two flourishing literary institutions, one at Newbury, called the *Newbury Seminary*, and the other at Poultney, called the *Troy Conference Academy*.

A portion of the methodist in this state, disapprove of the government of the methodist episcopal church, and have separated from it, under the name of protestant methodists, or Wesleyans.

12. *Baptists*. The first Baptist church in Vermont, was organized in Shaftsbury in 1768, and in 1790 there were thirty-five organized churches and sixteen hundred communicants.

The Baptist churches in the different sections of the state, are organized into associations, of which there are nine. In 1823 a general convention was planned and organized in aid of domestic and foreign missions.

periodical?—When and where was the first methodist church organized in Vt.?—What others followed?—What number of communicants in Vt.—How many ministers?—What literary institutions?—What separations have taken place?—When and where was the first baptist church formed?—How many in 1790?—How ma-

The number of baptist churches in Vermont, is about one hundred and forty, and the number of communicants about 12,000. They have several seminaries which are principally under their patronage and control; among which are the Vermont Literary and Scientific Institution at Brandon, the Black river Academy at Ludlow, the Leland School at Townshend and the Derby Institute at Derby.

13. *Episcopalians.* The first protestant episcopal churches in Vermont, were organized at Arlington and Manchester before the revolution. The first church edifice was built at Arlington, in 1786. The first episcopal convention was held in 1790, when Vermont became organized as a diocese.

From 1811 to 1832, this diocese constituted a part of what was called the eastern diocese, but in 1832 it withdrew from that connexion and elected a bishop of its own.

The convention, which consists of the bishop, the parochial clergy and delegates from the several churches, meets annually to make regulations and adopt measures for the good of the church.

The number of episcopal churches in the diocese is thirty-one, the number of ministers twenty-one, and the number of communicants about fifteen hundred.

14. *Freewill Baptists.* The first freewill baptist church was organized in Strafford, in 1794.

The churches are formed into several associations. Delegates from the associated churches meet once in three months, forming a *Quarterly Meeting*, at which reports are made respecting the condition of the several churches. Delegates from the several quarterly meet-

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ny associations?—When was their general convention organized?—How many baptist churches?—communicants?—What seminaries have they?—What is said of the first episcopal churches in Vt.?—the first church edifice?—the first episcopal convention?—How long was Vt. a part of the eastern diocese?—When elect a bishop?—Of what does the convention consist? What the number of churches?—ministers?—communicants?—What is said of the christians?—When was the free-will baptist church formed in Vt.—How are the churches associated?

ings, meet annually, forming a *Yearly Meeting*. There is also a *General Conference*, which meets once in two years.

The number of free-will baptist churches is about one hundred, ministers about seventy and communicants about forty-five hundred.

15. *Christians*. The first church of this order in Vermont, was formed at Lyndon, in 1801. They are called by this general title because they reject all those summaries of Christian faith by which the distinctions of the different denominations are kept up.

The number of preachers and churches is between thirty and forty.

16. *Universalists*. The universalists have about ninety societies and about forty preachers. There is a general convention of the universalists in Vermont, which meets once a year. They also have a weekly paper, the *Universalist Watchman*, devoted to their interests.

17. *Roman Catholics*. The roman catholics have several large congregations in the state, particularly at Burlington and St. Albans. Three or four churches have been built, and they have about the same number of ministers. The church members amount to several thousands, who are mostly foreigners.

18. *Unitarians*. There are five or six, unitarian societies in the state and three ministers.

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What meetings?—the number of churches?—ministers?—communicants? is said of the universalists?—What is said of the roman catholics?—of the unitarians?



## CHARACTER OF THE PEOPLE

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The first civilized inhabitants permanently settled in Vermont, were emigrants from the older parts of New England, and were almost wholly of English or Scotch descent. At the time the settlement was commenced, this whole tract of country was covered by an immense unbroken forest, inhabited only by wild beasts and traversed by merciless Indians, some of whom had their lodges upon the upper parts of Connecticut river and on the shores and islands of lake Champlain. It could not, therefore, be expected that any but the most bold and enterprising, would venture to expose themselves to the dangers and hardships of establishing themselves here; and as these were, for the most part, men of small fortunes and large families, the labor required in subduing the forests, cultivating the soil and providing the means of subsistence, left them little leisure for the improvement of their minds, or the refinement of their manners. Hence, as might be expected, their characters partook much of the boldness and roughness of the mountain and forest scenery, in the midst of which they resided. Being compelled, on account of their exposed situation, to face dangers of various kinds, and being accustomed to remove obstacles and surmount difficulties by their personal exertions, they soon acquired unlimited confidence in their own abilities, and imbibed the loftiest notions of liberty and independence. These traits of their general character were fully displayed during those vexatious and perplexing controversies in which they were, for twenty seven years, constantly involved; and they have at all subsequent periods, marked their proceedings in the council and in the field.

Though the fathers of Vermont were not liberally

educated, most of them had shared to some extent, in the benefits of that excellent system of common school education, for which New-England has always been distinguished; and though not learned, few of them were wholly illiterate. Nearly all were able to read and write a fair hand, and were sufficiently acquainted with the common rules of arithmetic to become correct accountants. Few of them were versed in the rules of grammar, but they all had sufficient knowledge of their mother tongue to be able to make their *meaning* understood, and many there were among them who could wield with effect, either the *quill*, or the *sword*, or the *axe*, as circumstances required. The writings of these men, their first attempts at legislation and various other memorials, which have been handed down to us, afford conclusive proof of the possession of intellect and talent of a high order. But they were like the marble from the quarry, roughly hewn, which exhibits the strength and value of the material, but in which the delicate veins, and colors, and shades have not been brought out and exhibited in all their pleasing variety by the skill of the polisher.

Among the inhabitants of this state, an equality in point of rank and property, and a sense of mutual dependence, have very generally prevailed, which have been highly favorable to the exercise of the social virtues and the friendly feelings of the heart. The Vermonters have hitherto been distinguished for their kindness among themselves—for their attention and hospitality to strangers, and for their benevolence to the suffering and needy, both at home and abroad; and it is to be lamented, and we fear, without being remedied, that the growing inequalities and distinctions of rank and property, are beginning to throw a chill over these gushing feelings of philanthropy, which warmed the hearts, animated the countenances and blended the sympathies of the earlier inhabitants of our land.

The female sex in Vermont may be recommended as patterns of industry and economy. They are nearly all habituated to household labors from their childhood, and they in general pride themselves much on account of their neatness and the management of their domestic affairs. They are accustomed to regard the family as the sphere, which they were particularly designed to occupy, and here they usually appear to the best advantage. In common with the other sex, they are all permitted to share in the benefits of common school instruction, but, till recently, very few have had an opportunity to extend their education to the polite accomplishments; and it is pleasing to observe, that parents now are not generally disposed to indulge their daughters in the pursuit of the ornamental, to the neglect of the solid and more useful branches of learning.

It is undoubtedly the duty of all parents, in training up and educating their daughters, to make it the primary object to fit them, not to shine and gain admiration at the opera, the assembly, or at public spectacles, but for the proper discharge of their duties as daughters and wives and mothers; which alone can make them truly happy. It is not the outward adorning of dress and plaiting the hair, nor even the mere cultivation of taste and intellect and refinement of manners, however proper and desirable these may be, which makes woman what she should be; but it is the training of them up in the knowledge and practice of their domestic and relative—their moral and religious duties.

# STATE OF VERMONT.

## PART THIRD.

### GEOGRAPHY BY COUNTIES.

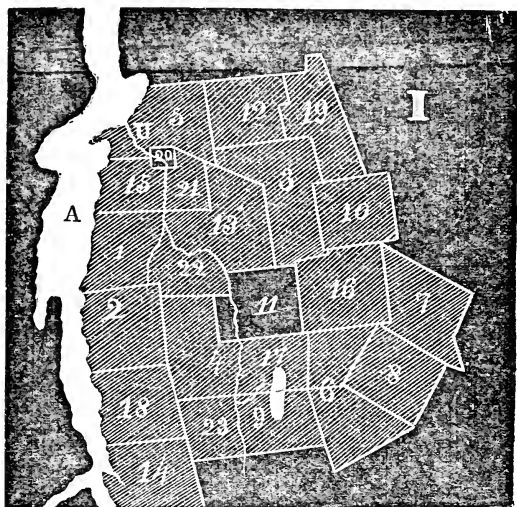
#### I. ADDISON COUNTY.

Incorporated, October 18, 1785	Number of towns, - - -	23
First settlement, - - - 1731	Square miles, - - -	719
Population in 1840, - - 25,087	Pop. to square mile, - - -	35

#### TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized	Pop. in 1840.	Sq. miles	Pop. to sq. mile.	Grand List.
1. Addison,	Oct 14, 1761	1731		1,232	41	30	\$5,912
2. Bridport,	Oct. 10, 1761	1768	1784	1,480	41	36	5,681
3. Bristol,	June 26, 1762		1789	1,233	41	30	3,133
4. Cornwall,	Nov. 3, 1761	1774	1784	1,164	32	36	3,731
5. Ferrisburgh,	June 24, 1762	1784	1786	1,755	45	39	7,133
6. Goshen,	Feb. 2, 1792	1800		621	30	21	914
7. Granville,	Aug. 2, 1781			545	45	12	954
8. Hancock,	July 31, 1781	1788	1792	465	36	13	724
9. Leicester,	Oct. 20, 1761	1773	1786	603	19	32	1,796
10. Lincoln,	Nov. 9, 1780	1790		770	36	21	1,387
11. Middlebury,	Nov. 2, 1761	1773	1786	3,162	43	73	8,255
12. Monkton,	June 24, 1762	1774		1,310	37	35	3,408
13. NewHaven	Nov. 2, 1761	1769		1,503	37	41	6,165
14. Orwell,	Aug. 8, 1763	1773	1787	1,504	42	36	7,981
15. Panton,	Nov. 3, 1764	1770	1784	670	16	42	2,210
16. Ripton,	April 13, 1781			357	37	10	913
17. Salisbury,	Nov. 3, 1761	1775		942	18	52	2,532
18. Shoreham,	Oct. 8, 1761	1766		1,674	41	41	6,781
19. Starksboro',	Nov. 9, 1780	1788	1796	1,263	29	44	1,911
20. Vergennes,	Oct. 23, 1783		1789	1,017	2	508	4,283
21. Waltham,		1796		283	9	31	1,286
22. Weybridge,	Nov. 3, 1761			779	17	46	2,787
23. Whiting,	Aug. 6, 1763	1773	1785	659	20	33	1,884
Avery's Gore,	- - -	-	-	78	5	-	-
				25,087	719	35	81,770

When was Addison County incorporated?—settled?—population?—towns? square miles?—population to a square mile?—Which town first chartered?—first organized?—most populous?—wealthiest? &c.



A Lake Champlain. U Otter Creek.

*Situation.* Addison County, borders upon lake Champlain, and lies about mid way between the northern and southern extremity of the State.

*Boundaries.* It is bounded on the north, by Chittenden county, east by Washington, Orange, and Windsor counties, south by Rutland county, and west by lake Champlain.

*Extent.* This county is about 38 miles long, from north to south, and 33 miles wide from east to west, containing 719 square miles. It extends over the summit of the Green Mountains, and embraces the township of Granville, lying upon the east side. It is divided into 23 townships, one city, and one gore.

*Shire Town.* Middlebury.

*Surface.* The western part of the county is general-

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How is Addison Co. situated?—How bounded?—What its length?—width?—square miles?—number of towns?—its surface?—mountains?—height of the

ly level. The central parts consist swells and hills, extending north and south. The eastern parts are elevated and mountainous.

*Mountains.* The Green Mountain range occupies the eastern parts of the county, and is here quite elevated, but exhibits no prominent and noted summits. In passing, even this range, the roads in this county, attain a greater elevation, than in any other part of the state. The following height have been deduced from barometrical observations.

Road in Lincoln,	2325	feet above lake Champlain.
" Granville,	2250	" "
" Hancock,	2020	" "
" Goshen,	2250	" "

The principal summits in other parts of the county, are Snake mountain, in Addison, 1217 feet above the lake, Mount Nebo, in Middlebury, and Buck's mountain in Waltham.

*Rivers.* The principal stream is Otter creek, which runs in a north western direction, thro' the county near its centre. The other streams of most consequence, are Lewis creek, and Little Otter creek, in the north, part Lemonfair river, in the western part, and New Haven river, and Middlebury river, which rise in the mountains, in the eastern part, and fall into Otter creek.

*Falls.* There are falls in Otter creek, at Vergennes, Weybridge and Middlebury, all of which furnish excellent sites for mills, and are to some extent occupied. Most of the other streams abound in falls and rapids, on which mills are erected, with the exception of Lemonfair river, which is very sluggish.

*Ponds.* The most important collection of water in the county, is lake Dunmore in Salisbury, and Leicester. This lake is about four miles long. It discharges through what is called Leicester river, into Otter creek.

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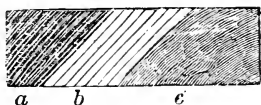
roads over the mountains?—What summits mentioned?—What the principal stream?—the other streams?—What falls?—What lake?—What is said of it?—

In this outlet are falls which furnish good mill privileges. Trout, (Longe) weighing 25 pounds have been taken out of lake Dunmore.

*Springs.* The springs, and the water, generally in the western part of the county, are impregnated with Epsom salts, (sulphate of magnesia,) particularly in Addison, and Bridport. Some of the springs are so strongly impregnated, that in times of low water, a pailfull will yield a pound of the salts, and formerly they were manufactured to some extent.

*Geology.* The rocks which are exposed in the bluffs on the lake shore, along the west side of this county, are the Isle la Motte limestone, Trenton limestone, and Utica slate. On the west side

of Panton, these are all seen in contact, as exhibited in the section. Fig. 35, *a* being Utica slate. *b* Trenton limestone. *c* Isle la Motte limestone.



The Isle la Motte limestone, at Shoreham, furnishes a very good black marble, which has been wrought.

The rocks in this county have been very much disturbed. The uplift which constitutes Snake mountain, exhibits in a small space, all the fossiliferous rocks found in the state; except perhaps, there may be a few fossils in some of the Taconic rocks. A section exhibiting the position and order of the strata in Snake mountain, has already been given on page 63.

The red sandrock extends from Snake mountain, through Waltham, Ferrisburgh and Monkton, into Chittenden county. In Monkton, there is a remarkable plication of this rock, called the Oven, which forms a very great geological curiosity. The south end of the plication is exhibited in the cut where the spaces be-

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What is said of the springs?—What is Epsom salts composed of?—What rocks exposed along the lake shore?—Where seen in contact?—What is said of Shoreham?—Snake mountain?—of section?—the red sandrock?—Describe the fold in the strata called the oven?—What rock in the central part of the county?—What

tween the lines, represent the edges of the strata. With the exception of the one marked *c c* the strata are all very siliceous, and some of them almost pure quartz. The stratum *c c* is argillaceous, having a slaty lamination perpendicular to the plane of deposit. The upper part of this fold represented by the dark shade in the cut, has been removed, forming a cavity between the more siliceous strata which is called the *oven*. The portion represented in the cut, is about 39 feet broad at the base.

(36)



The principal rock passing through the central part of the county, along the valley of Otter creek, is the Stockbridge limestone, of the Taconic system. This limestone furnishes excellent marble at Middlebury, where it has been extensively quarried and sawed for exportation.

To the eastward of this limestone, quartz rock occurs and is succeeded by mica slate or Green mountain gneiss, and by the talcose slate formation.

*Dikes.* There are a few greenstone, and porphyry dikes, in this county, but they are by no means so numerous as they are further north, in Chittenden county. Two very interesting porphyry dikes are found in the bank and bed of Lewis creek, in Ferrisburgh. One is about four rods below the bridge, on the stage road from Vergennes to Burlington, and the other about the same distance below the bridge, at the mills, half a mile east of the north meetinghouse in Ferrisburgh. The latter is 20 feet wide, and is divided diagonally, by a vein of calcareous spar eight inches wide.

*Ores.* Iron ore is found in Leicester, Salisbury, Rip-ton, Bristol, Monkton and perhaps in other towns. It

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next?—still further east?—What is said of Dikes?—Describe it?—Where is one found?—What kind?—Where most abundant?—What is said of iron ore?—What



is mostly the brown oxide or brown hematite. It has been found most abundantly in Monkton and Bristol, where considerable quantities have been worked. Iron sand is found on the lake shore at Chimney Point in Addison. It is an excellent sand for writing, and has been used as a coloring ingredient in the mortar in St. Steven's church Middlebury.

*Minerals.* Sulphuret of iron, schorl, jasper, garnets and rock crystal, are found in several places. Calcareous spar is also common, and the waters of several springs deposit calcareous tufa.

*Fossils.* The fossils which are characteristic of the Isle la Motte limestone, the Trenton limestone and the Utica slate are very abundant in those formations at many places in this county on and near the lake shore.

The marine fossil shells of the pleistocene sand and clay, are found in many places in the western townships of this county. There is a locality of these just north of the city of Vergennes, on the stage road to Burlington. They may be seen in the banks of the ditch on the east side of the road in going up the hill towards the north from the bridge by the tannery.

*Building Materials.* The Isle la Motte limestone in the eastern part and the red sandrock and Stockbridge limestone in the central part, furnish an abundance and sufficient variety of good building stone. Clay is common in most parts of the county, but in many places contains too much lime to make good bricks. The Stockbridge limestone in this county furnishes a very excellent marble, particularly at Middlebury, where it has been quarried and manufactured for more than forty years.

*Soil and Productions.* The western and central parts of this county have a tolerably even surface and a strong rich soil. In those parts clay predominates and

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minerals are found?—What fossils?—What is said of fossil shells?—What building materials?—What is said of the clay?—marble?—soil?—of the eastern parts?

in places to such a degree as to make the soil stiff and hard to till, but it is generally very productive. The eastern part of the county lies upon the Green Mountains, and is less suited to tillage, but furnishes excellent pasturage. Very fine horses are raised in this county.

The productions according to the returns of 1840 were as follows :

Horses,	-	5,425.	Rye,	bushels,	11,427.
Cattle,	-	39,718.	Buckwheat,	"	7,219.
Sheep,	-	261,010.	Indian Corn,	"	95,304.
Swine,	-	14,305.	Potatoes,	"	440,079.
Wheat,	bushels,	31,322.	Hay,	tons,	111,120.
Barley	"	- 225.	Maple Sugar	lbs.	132,013.
Oats	"	- 141,794.	Wool,	-	" 676,969.

*Villages.* Middlebury and Vergennes are the two principal places in this county, and are both situated on Otter creek.

Vergennes, though not so large as some of the other villages in the state, has a city charter and a city organization. It is situated at the lower falls on Otter creek, which furnish an abundance of available water power. The city charter embraces a territory a little more than one mile square.

Middlebury is twelve miles south east from Vergennes, and is the shire town of the county. It contains four or five churches, several cotton and woollen factories, and the edifices of Middlebury College.

The Burlington and Rutland rail road passes through both of the above villages.

*Education.* Middlebury college (see page 123,) is situated in the centre of the county, and has exerted a good influence over the the educational interests of the neighborhood. There is also a respectable female seminary in Middlebury.

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of the eastern parts ? How many horses in 1840 ?—cattle ?—sheep ? &c. Which are the principal places ? What is said of Vergennes ?—of Middlebury ?—of educa-

The number of common schools in the county is 197, and they are, many of them, of high order for schools of that class.

*Pursuits.* The pursuits are chiefly agricultural. In the census of 1840, the returns show that 100 were engaged in commerce, 1,076 in manufactures and trades, and 116 in the learned professions. The production of wool has been a favorite pursuit.

*History.* The first civilized establishment on the west side of the Green Mountains, within the present limits of Vermont, was made at the place now called Chimney Point, in the town of Addison. It was made by the French, in 1731, the same year in which they built fort Frederick, which was afterwards called Crown Point.

The establishment at Chimney point consisted of a number of small dwellings, and a large stone windmill, which served the double purpose of a mill to grind meal for the little settlement and garrison and a fort to defend them from the enemy, for in it were six cannon mounted for service.

Chimney point is probably indebted for its name, to the ruins of this mill, they having been mistaken by the early American settlers for the remains of chimneys.

The French abandoned Chimney point in 1759, but no settlements were made within the county by emigrants from other parts of New England, till 1769, when a settlement was effected in what is now Waltham and a saw mill was erected upon the falls in Otter creek now in Vergennes. Settlements were made in Middlebury and some other towns in 1773, and 1774.

During the revolution, after the British got possession of lake Champlain in 1776, the settlements within the county were all abandoned. But at the close of the war in 1783, the settlements were renewed, and, in the course

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tion?—of common schools? What is said of the pursuits? What the first civilized establishment? When? What is said of Chimney point?—its name?—When abandoned by the French?—When the first English settlement?—What took place during the war?—at the close of the war?—What did the county em-

of two or three years they were in progress in most of the towns in the central and western parts of the county.

When Addison county was incorporated, in 1785, it embraced all the territory in Vermont on the west side of the mountains, to the northward of Rutland county. When Chittenden county was incorporated two years after, Addison county was restricted to very nearly its present limits.

## II. BENNINGTON COUNTY.

Incorporated, Feb. 11. - 1779	Number of towns, . . . 17
First settlement, . . . 1761	Square miles, - - - 612
Population in 1840, - 16,872	Population to square mile, 27½

### TONWS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Gr. List, 1837.
1. Arlington,	July 28, 1761	1763	1768	1,038	39	26½	3,873
2. Bennington,	Jan. 3, 1759	1761	1762	3,429	39	87½	10,566
3. Dorset, [y	Aug. 20, 1761	1768	1769	1,426	41	34½	3,561
4. Glastenbur	Aug. 20, 1761			53	40	1½	172
5. Landgrove,	Nov. 8, 1780	1769	1800	344	8	43	532
6. Manchester	Aug. 11, 1761	1764	1766	1,594	39	41	5,146
7. Peru,	Oct. 13, 1761	1773	1802	578	39	15	844
8. Pownal,	Jan. 8, 1760	1762		1,613	39	41½	4,203
9. Readsboro'				767	35	22	1,068
10. Rupert,	Aug. 20, 1761	1767		1,086	39	28	4,031
11. Sandgate,	Aug. 18, 1761	1771		776	39	20	1,638
12. Searsburgh	Feb. 23, 1781			120	18	7	234
13. Shaftsbury,	Aug. 20, 1761	1763		1,885	41	46	5,597
14. Stamford,	Mar. 6, 1753			662	39	17	1,546
15. Sunderland	July 30, 1761	1766	1769	438	39	11½	1,006
16. Winhall,	Sep. 15, 1761		1796	576	39	14¾	1,162
17. Woodford,	Mar. 6, 1753			487	39	12½	928
				16,872	612	27½	46,107

brace when incorporated?—When restricted?—When was Bennington county incorporated?—settled?—population?—number of towns?—square miles?—population to a square mile?—Which town first chartered?—first settled?—first organized?—most populous?—wealthiest? &c.



and many parts of it mountainous. The waters flow from the countys as may be seen by the map, in all directions. The principal range of the Green Mountains stretches along the eastern part of the county, while a subordinate range, called the *Taconic*, passes through the western part. The principal summit of the latter is Equinox mountain in Manchester, which has been calculated to be 3706 feet above tide-water. The highest part of the road over the Green Mountains in Peru, is about 2100 feet above the tide. Mount Anthony, in Bennington is a considerable elevation.

*Streams.* The head branches of Deerfield river, and West river rise in the eastern part of the country. From the south and west parts the waters are carried by Hoosic river, and the Battenkill, into the Hudson in the state of New-York. From the north part they are conveyed by Pawlet river and Otter creek into lake Champlain. The principal streams within the county are the Battenkill and Walloomscoik rivers. The latter runs through Bennington and falls into the Hoosic, in the state of New-York. It was on the bank of the Walloomscoik, near where it crosses the state line, that the Bennington battle was fought.

*Falls.* All the streams abound in falls and rapids, and furnish numerous and excellent mill privileges, which are extensively occupied, especially in Bennington.

*Curiosities.* There are several large and curious caves in Dorset, one of which is much more extensive, than any other known in the state. There is an interesting cave on the east side of Mount Anthony, in Bennington, about one mile from the centre village, in which are numerous stalactites. There is also another interesting cave in Manchester, on the east side of Equinox mountain.

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How do the waters flow? What mountains?—what said of Equinox?—What streams in the eastern part?—southern?—What is said Wollomecoik? What is said of falls? What caves in Dorset?

*Geology.* The rocks of all the western and central parts of the county belong to the Taconic group. Those of Rupert, Sandgate, Arlington, the greater part of Shaftsbury and the northwestern corner of Bennington, are magnesian slate. East of this, extending from Pownal to Dorset, is the range of Stockbridge limestone. Adjacent to this limestone, still farther east, is the range of quartz rock of the Taconic system. The rocks of the remainder of the county lying east of a line extending from the centre of Stamford to the centre of Peru, are Green Mountain gneiss.

In the range of Stockbridge limestone in this county, quarries of marble have been opened in various places. The quarries in Dorset have been most extensively wrought. This marble is white, and because sawed in Manchester, is often called *Manchester marble*.

*Ores.* Iron ore, (brown hematite) is found in Bennington, Manchester and Dorset. The most extensive iron works are in the east part of Bennington, and the ore used in them is obtained from two beds, one near the works, and the other in the western part of the town.

The black earthy oxide of manganese is found in great abundance in Bennington, in connexion with the iron ore. Ochre is also found in Bennington, and about 500 tons of it are prepared and sent to market annually.

*Building Materials.* The range of Stockbridge limestone furnishes an abundance of good building stone, and in most parts there is a plenty of clay and sand for bricks.

*Clay.* Besides the common brown or blue clay, there are in this county several beds of *white* or *pipe clay*, often called Kaolin. These beds are also sometimes called *putty-beds*.

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In Bennington?—in Manchester? What rocks in the western and central parts? What their order? What to the eastward? What is said of the limestone?—marble? Where is iron ore found? Where abundant? What is said of the oxide of manganese?—of ochre?—of building materials?—clay?

One of these beds, in the east part of Bennington, supplies an extensive manufactory of fire-bricks, and stone ware, in the east village in that town.

*Soil and Productions.* A considerable proportion of this county is mountainous and broken, and suitable only for grazing. But there are in the vallies and on the slopes, large tracts of excellent tillage lands from which good crops are obtained.

The statistics of the last census show that there were in 1840

Horses	- - - -	3397	Rye, bush.	- - -	25671
Cattle	- - - -	16879	Buckwheat	- - -	16071
Sheep	- - - -	101721	Indian Corn	- - -	70215
Swine	- - - -	9906	Potatoes	- - -	561279
Wheat, bush.	- - -	12959	Hay, tons	- - -	42907
Barley, do	- - -	1519	Maple sugar lbs.	- - -	180986
Oats do	- - -	137837	Wool do	- - -	223674

*Manufactures.* These consist principally of iron and cotton and woollen goods. The iron produced in 1840, was 1829 tons. There were then in the county, 5 furnaces and 8 woollen and 3 cotton factories.

*Pursuits.* In 1840, according to the returns of the census, there were in this county 3097 engaged in agriculture, 83 in commerce, 945 in manufactures and trades and 84 in the learned professions.

*Villages.* The principal villages are in Bennington, Manchester and Arlington. In Bennington there are several villages. The most important of these are Bennington Centre and the *East* village. The East village is largest, but the county buildings are at the Centre.

*Education.* The number of school districts in this county 146 and the number of children between 4 and 18 years of age is about 5700. There are flourishing academies at Bennington and Manchester. Union Acad-

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What is made of it? What is said of soil? &c. How many horses? &c. What is said of manufactures?—of the pursuits? What are the principal villages?—What the number of school districts?—scholars? What academies?



emy at Bennington is under the patronage of the Baptist denomination.

*Burr Seminary*, at Manchester, owes its existence to the munificence of the late Joseph Burr, Esq. In the distribution by his will of his large estate in 1828, he left \$10,000 to found a literary institution in Manchester. The institution was incorporated Oct. 28, 1829, and the school commenced in May 1833.

*History.* The first township chartered within the state; and the first permanent settlement in Vermont on the west side of the mountains, was in Bennington county in the town of Bennington, in the spring of 1761.

In this county was formed the first organized opposition to the claims of New-York to the territory called the New-Hampshire grants. In this county the council of safety held its meetings previous to the formation of the state government.

On the west line of this county, on the 16th of Aug., 1777, was fought the celebrated Bennington battle, which gave the first check to the proud career of Burgoyne. The trophies of that battle were, in part, four brass field pieces, two of which have by the generosity of the general government, been recently placed in the Capitol of Vermont at Montpelier, there to remain as monuments of the valor of the Green Mountain Boys.

The first Christian church formed within the present limits of Vermont, was the Congregational church in Bennington, which was organized Dec. 2, 1762; and the first settled minister was the Rev. Jedediah Dewey, who was settled over this church in the fall of 1763.

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What is said of Burr Seminary? Which was the first township granted and permanently settled in the western part of the state? What took place here?—what near the west line of the county? Where are two of the field pieces? When and where was the first church formed in Vt.?—minister settled?

## III. CALEDONIA COUNTY.

Incorporated Nov. 5, - 1792	Number of towns, - - 18
First settlement, - - 1770	Square miles, - - - 640
Population in 1840, - 21,891	Pop. to the square mile, - 34

## TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized	Pop. in 1840.	Sq. miles	Pop. to sq. mile.	Gr. List, 1847.
1. Barnet,	Sept 15, 1763	1770	1783	2,030	40	51	\$4,857
2. Bradleyvale,	Jan. 27, 1791			50	6	8	
3. Burke,	Feb. 26, 1782	1790	1796	997	36	28	2,281
4. Cabot,	Nov. 6, 1780	1785		1,440	36	40	3,169
5. Danville,	Oct 31, 1786	1785	1787	2,633	44	60	6,220
6. Groton,	Oct. 20, 1789	1787	1797	928	38	24 $\frac{1}{2}$	1,726
7. Hardwick,	Aug. 19, 1781	1790	1795	1,354	36	37 $\frac{3}{4}$	3,778
8. Kirby,	Oct. 27, 1790	1799	1807	520	19	27 $\frac{1}{2}$	1,185
9. Lyndon,	Nov. 20, 1780	1788	1791	1,753	36	49	4,746
10. Newark,	Aug. 15, 1781	1800		360	36	10	684
11. Peacham,	Dec. 31, 1763	1775		1,443	40	36	4,781
12. Ryegate,	Sep. 8, 1763	1774		1,223	34	36	3,006
13. St. Johnsbury	Nov. 1, 1786	1786	1790	1,887	35	54	6,234
14. Sheffield,	Nov. 7, 1780			821	35	23 $\frac{1}{2}$	1,371
15. Sutton,	Feb. 6, 1782	1791		1,068	36	29 $\frac{2}{3}$	1,923
16. Walden,	Aug. 18, 1781	1789	1794	813	36	25 $\frac{1}{3}$	1,962
17. Waterford,	Nov. 8, 1780	1787	1793	1,388	36	38 $\frac{2}{3}$	3,471
18. Wheelock,	June 14, 1785	1790	1792	881	36	24 $\frac{1}{2}$	320
Goshen & Harris Gores.	- - -	-	-	202	25	8	
				21,891	640	34	51,723

*Situation.* Caledonia county is situated, in the north-eastern section of the State, and embraces the territory watered by the Passumpsic, and by the head branches of Winooski and Lamoille rivers.

*Boundaries.* It is bounded north by Orleans county, east by Essex county and Connecticut river, south by Orange county, and west by Washington, Lamoille, and Orleans counties.

*Extent.* The extreme length of this county from north to south is about 40 miles, and its width is about

When was Caledonia county incorporated?—settled?—population? Number of towns?—square miles? Population to square mile?—Which town first settled?—most populous?—most wealthy? &c. How situated? How bounded? What the extent?—area?—number of towns?



A Connecticut River. K Wells River. L Passumpsic River.

28 miles. Its area is 610 square miles. It is divided into 18 townships and three small gores.

*Shire Town.*—Danville.

*Surface.* Much of this county is quite elevated, constituting what is called the height of lands, but the surface is less broken than that of several other counties in the State. There are no mountains within the county worthy of particular notice.

The heights of several points in this county above the mouth of Passumpsic river were determined by the surveys, made by De Witt Clinton, between 1825 and 1830, to ascertain the practicability of a canal route from Connecticut river to lake Memphremagog. The

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Shire town? What is said of the surface? How were the heights mentioned ascertained?

mouth of the Passumpsic is supposed to be 449 feet above tide water; this number being added to the numbers below will, if correct, give the heights of the several places above the sea:—

Lyford's pond, Walden,	-	-	1228 feet.
Joe's Pond, Cabot,	-	-	1080 "
Onion river, pond, Peacham,	-	-	1043 "
Keezers pond, Danville,	-	-	840 "
Savanna pond, Sutton,	-	-	746 "
Cahoon mill dam, Lyndon,	-	-	209 "
Wells river pond, Groton,	-	-	634 "
Ramsey's mill dam, St. Johnsbury,			100 "
Mouth of Moose river,	"		68 "
" of Joe's brook, Barnet,	-		28 "

*Streams.* The southwestern part of the county is watered by Wells river; but full three-fourths of the county are watered by the Passumpsic and its branches.

The most important branches of the Passumpsic are Moose river and Joe's brook, or Merritt's river. The former rises in Essex county, and is about 24 miles long. The latter originates in Cole's pond, in Walden, passes through Joe's pond, and joins the Passumpsic in Barnet. The Winooski, Lamoille, and Barton river, all receive waters from this county. The streams furnish convenient water power in all parts of the county. The mill privileges at the outlet of Joe's pond are remarkably good.

*Ponds.* Ponds are numerous in this county. The most important are:—Joe's pond, Cole's pond, Wells river pond and Harvey's pond.

The following is a list of the principal ponds, their areas and height above tide:—

Joe's pond, Cabot,	1000 acres,	1529 feet.
Molly's pond, Cabot,	60 "	1611 "
Cole's " Walden,		
Lyford's " "		1677 "

What the highest pond? How situated? Describe the Passumpsic and its branches? What rivers rise in the county? What mill privileges mentioned?—What ponds? What the size and length of Joe's pond? &c.

Onion river pond,	Peacham,	300 acres,	1492	"
Hosmer's	"	"	250	"
Wells river	"	Groton,	800	" 1083 "
Little	"	"	100	"
Stiles	"	Waterford,	100	"
Harvey's	"	Barnet,	300	"
Ross'	"	"	100	"

*Springs.* The only spring in this county which has attracted attention is in Hardwick, and is thought to be efficacious in some cutaneous complaints.

*Geology.* The rocks of Caledonia are primitive, and belong to the calcareo-mica slate formation, but granite has been forced up through this formation in numerous places, and the rock in the southwestern parts, embracing the greater part of Groton and Peacham, and the western part of Danville, and eastern part of Cabot, are almost exclusively granite. Large quantities of granite are likewise found in Walden, Hardwick, and Ryegate. Much of the rock in Cabot, Walden, and Wheelock, is hornblende slate, and there is a range of clay slate, which forms high bluffs along Connecticut river, and extends north through Waterford and Kirby.

*Dikes.* Greenstone and granite dikes are not uncommon. One of the former in Barnet, near the mouth of the Passumpsic, acquired some notoriety for a time on account of being mistaken for a vein of iron ore.

*Marl.* The deposits of shell marl in this county are very numerous; more numerous probably than in any other county in the state; and several of them are quite extensive. The greater part of these beds are covered with a thick layer of black muck, but several of them are covered immediately by the water with no muck intervening. The shell which appear most abundant in some of these beds, is a large species of *cyclas*. Fig. 39.

(39)



What springs? What said of infusorial silica? What is said of the rocks?—of granite? Where is hornblende slate found?—clay slate? What is said of dikes?—of shell marl?—of the beds? of shells?

In Hosmer's pond in Peacham there is a deposit of *infusorial silica*, which is a white substance resembling marl in appearance, but consists of silex instead of lime. It is made up of the shields of so very minute animalcules that it would take many billions of them to make a cubic inch. It has already been described on page 52.

*Ores.* Iron ore has been found in Waterford, and in small quantities at some other places, but no large deposits have yet been discovered.

*Minerals.* This county furnishes a considerable variety of interesting minerals, among which are ensiform crystals of feldspar, staurotide, garnet and hornblende in Cabot; the first near Joe's pond, and the others in the hornblende slate, a little below the lower village, near the road to Montpelier. In Walden are found large quantities of stellar crystals of hornblende in a dark arenaceous limestone. About two miles south of Danville village there is a seam of impure plumbago or black lead.

*Soil and Productions.* The soil along the Passumpsic is inclined to sand, but is easily tilled and productive. Westward from this stream, till the granite is reached in the western part of Danville and Peacham, there is a greater mixture of clay and lime, and the soil is very rich and strong. The region of granite is rough and not easily tilled, but is good for grazing. The statistics in 1840 were as follows:—

Horses,	-	-	5,852	Indian Corn,	-	52,250
Cattle,	-	-	32,668	Rye, bush.,	-	1,799
Sheep,	-	-	100,886	Buckwheat,	-	12,005
Swine,	-	-	18,991	Potatoes,	-	1,066,848
Wheat, bush.,	-	-	52,109	Hay, tons,	-	67,077
Barley,	-	-	12,291	Maple Sugar, lbs.,	-	665,397
Oats, bush.,	-	-	342,433	Wool,	-	" 183,193

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What of iron ore?—of minerals? What minerals mentioned? What fossils are found? What is said of building materials? What do the returns of 1840 show?

*Fossils.* The fossils are those of the marl beds, consisting mostly of the genera, planorbis, limnaea and cycas, and those of the infusorial silica, in which more than a dozen known species have been recognized.

*Building Materials.* Granite, either in place or in large boulders, and of the best quality is found in various parts of the county. One of the most interesting quarries is in what is called Blue mountain in Ryegate. The stone is divided by seams into beds, or plates, which may be easily raised, of almost any required thickness or dimensions. Deposits of clay and sand are found in most parts of the county.

*Pursuits.* The returns of 1840 show that 6094 in this county were engaged in Agriculture, 913 in manufactures and trades, and 103 in the learned professions.

*Villages.* The villages are all small. The principal are Danville, St. Johnsbury, Barnet, Lyndon and Cabot. Danville is the shire town. The village is on elevated ground in the midst of a beautiful farming country. It contains the county buildings, an academy and three churches.

*Education.* The number of school districts is 221, and the number of scholars between 4 and 18 years of age, 7027, or about 33 to each district. The average length of the schools is 21 weeks in the year.

Caledonia county grammar school was located at Peacham in 1795, and has been one of our most useful academies. Philips academy was incorporated at Danville in 1840.

*History.* The first settlement within this county was made in Barnet, in 1770, by Jacob, Elijah and Daniel Hall, and Jonathan Fowler. The first gristmill was built in the same town in 1772, by Enos Stevens. In 1774, settlements were commenced in Ryegate by emigrants from Scotland.

In 1776, General Bailey commenced making a road from Newbury through Peacham, towards Canada, and in 1779, General Hazen continued this road through Cabot, Walden, &c. to Lowell. The object of this road was said to be to enable the United States to send an army into Canada. This road was of great service in the first settlement of the northern parts of the state.

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What is said of villages?—the principal?—Danville? What the number of school districts?—scholars?—length of school?—grammarschools? When, where and by whom was the first settlement made?

and was generally known by the name of the *Hazen Road*.

Settlements were begun in Peacham in 1750, and this being the frontier post, a small block house was built and garrisoned by a sergeant's guard. This guard was however withdrawn in the fall, and the settlers left to look out for themselves. In March following a party of the enemy from Canada came upon them carried off a number of prisoners, among whom were Col. Thomas Johnson of Newbury, Jacob Page, and Col. Jonathan Elkins. Col. Elkins was carried a prisoner to England, but subsequently returned and resided in Peacham.

#### IV. CHITTENDEN COUNTY.

Incorporated, October 22, 1787	Number of towns, - - -	15
First settlement, - - - 1774	Square miles, - - -	485
Population in 1840, - - 22,977	Pop. to the square mile, - -	47½

##### TOWNS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1820.	Sq. miles.	Pop. to sq. mile.	Gr. Est. 1847.
1. Bolton,	June 7, 1763			470	44	11	\$1,001
2. Burlington,	June 7, 1763	1774	1787	4,271	26	164	18,247
3. Charlotte,	June 21, 1762	1784		1,620	38	43	5,755
4. Colchester,	June 7, 1763	1774	1791	1,739	31	56	5,306
5. Essex,	June 7, 1763	1783	1786	1,824	36	51	4,182
6. Hinsburgh,	June 21, 1762	1783	1787	1,682	26	47	4,622
7. Huntington,	June 7, 1763	1786	1786	914	24	38	1,813
8. Jericho,	June 8, 1763	1772	1786	1,685	28	60	4,699
9. Milton,	June 8, 1763	1778	1788	2,134	40	33	5,819
10. Richmond,		1773	1774	1,654	27	39	3,305
11. Shelburne,	Aug 18, 1762	1772	1787	1,608	24	46	4,032
12. St. George,	Aug 18, 1763	1771	1783	121	3	40	360
13. Underhill,	June 8, 1763	1786	1793	1,441	46	32	2,254
14. Westford,	June 8, 1763			1,352	26	38	2,618
15. Williston,	June 7, 1763	1774	1786	1,554	34	46	4,883
Buel's & Avery's Gore,	- -	- -	- -	18	9	2	
				22,977	485	47½	68,925

The first mill built? What is said of Rye Lake?—of the Hazen Road?—its object? What took place in Peacham? When was Chittenden county incorporated?—settled?—population?—number towns?—square miles?—population to square mile? Which town first settled?—organized? &c.





A Lake Champlain. R Lamoille River. S Winooski River.

*Situation.* Chittenden county is situated in the north western part of the state, and borders on lake Champlain.

*Boundaries.* It is bounded on the north by Franklin county, east by Lamoille and Washington counties, south by Addison county and west by lake Champlain.

*Extent.* This county is 39 miles long from north to south, and 22 miles wide from east to west, and contains 485 square miles. This territory is divided into 15 townships and two small gores.

*Shire Town.* Burlington.

*Surface.* The surface of this county, though considerably diversified, presents a gradual elevation from

How is Chittenden county situated?—bounded?—extent?—number of towns?—square miles?—shire?—What the surface?

the shore of lake Champlain to the highest summit of the Green Mountains. There are some considerable tracts in the western parts which may be called level, but most of the land lies in swells and acclivities which, in the eastern part, rises into mountains. The alluvial flats along Winooski river, are fertile and beautiful, and are considerably extensive, particularly in Burlington, Colchester and Richmond.

*Mountains.* The eastern boundary of this county passes over the summits of some of the most lofty elevations in the state. These are the several peaks of the Mansfield mountains and Camel's Hump. The Mansfield mountains were originally within the township of Mansfield. That part of Mansfield lying west of the summits of these mountains was annexed to Underhill. Camel's Hump lies on the line between Huntington and Duxbury, in the county of Washington.

The following are the heights of several places in this county, above lake Champlain, which have been ascertained by measurement.

Snake Hill, Milton,	822	feet
Cobble Hill "	737	"
Sugar Loaf, Charlotte	913	"
Underhill Flat	575	"
Church at Jericho Corners	514	"
Essex Village	362	"
University of Vermont	277	"
Court House Burlington, (beginning of brick work)	112	"
Church at Winooski village	113	"
Church at Williston	312	"
Richmond village (R. Road Survey)	242	"

*Rivers.* Chittenden county is well watered. The river Lamoille passes through the north western part, the Laplot waters the southern part, while the Winooski river runs through the county near the centre, in a north western direction, and falls into the lake, four

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Western part?—flats?—of the eastern boundary? What summits?—in what towns? What the height of Snake hill?—Cobble?—Sugar Loaf? &c. How watered?—in north?—south west?

miles in a straight line northwesterly from the village of Burlington. The northeastern part of the county is watered by Brown's river, which rises in Underhill, and taking a circuit through Jericho, Essex and Westford, falls into the river Lamoille in Fairfax, in Franklin county. The southeastern part is watered by Huntington river, which rises in Avery's and Buel's gore, runs through Huntington, and falls into Winooski river in Richmond.

The streams furnish an abundance of water for mills and manufactories in all parts of the county, and particularly at the falls in Lamoille river in Milton and Winooski falls, between Burlington and Colchester.

*Falls.* The most interesting falls in this county, are the Great falls, in Milton, and Winooski falls. The former are at present unoccupied, and surrounded by wild and romantic scenery. On Winooski falls are a large woollen factory, a cotton factory and a variety of other mills and machinery. Half a mile above these falls the Winooski has cut a channel through the limestone rock for nearly a quarter of a mile in length. Portions of this channel are not more than 70 feet wide at the top and are more than 60 feet deep, having both sides nearly perpendicular. A bridge has been thrown across the upper part of this channel, which is generally known as the *High Bridge*. The vicinity of this bridge is a botanical locality celebrated for rare plants. The Central railroad passes for some distance along the brink of this chasm, and then crosses it twice before reaching the lower end.

*Ponds.* The ponds are small, and not numerous. Shelburne pond and Hinesburgh pond, are the most considerable. There is also a pond in Essex, and another in Milton; the latter contains a large quantity of shell-marl.

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Central? north east? What is said of the streams?—falls? What falls mentioned? What of Winooski falls? What is said of channels?—of High bridge?—Where does the rail road pass? What ponds?—of the one in Milton?

*Geology.* The rocks in the eastern half of this county are all primary. Those in the western half, belong to the transition, or palæozoic division.

The primary rocks of this county, are mostly talcose slate, being in some parts chloritic, and in others approaching to mica slate. Through Underhill and Jericho, at the foot of the mountains, runs a narrow range of plumbaginous slate.

The lowest palæozoic rock, which appears in this county, is the Trenton limestone. This occupies a small space in the south western part of the county and extends along the lake shore a little to the northward of McNeil's Ferry in Charlotte. It is succeeded to the east by a small extent of bird's eye limestone. Then follows a dark shale, which is succeeded by the red sandrock group.

Between the shale and the sandrock, are occasionally interposed beds of light blue limestone, of considerable thickness. This is the case at Charlotte, a little south of Glebe Hill, at Burlington, near Lonerock point, and at Mallet's bay in Colchester.

The lower and central portions of the red sandrock group, are, for the most part, of a chocolate red color, distinctly stratified, and composed essentially of minute grains of quartz. Above Winooski falls, and at several places in Colchester, the strata, of a thickness of 50 feet, consist entirely of brown quartz. But in general the strata in this series become more calcareous in proceeding eastward, till they pass into a very good limestone. This is the case in Colchester, in the east part of Burlington and Shelburne, and the western part of Hinesburgh, at all of which places it is made into excellent quicklime.

The palæozoic rocks in this county are to a great ex-

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What are the rocks? What said of the primary? What in Underhill? What is said of Trenton limestone?—the bird's eye?—of blue limestone?—localities?—red sandrock?—brown quartz?—limestone?—at what places?

tent, covered by a deposit of clay and sand which is regularly stratified. In this deposit are found a great abundance of fossil sea shells. There are interesting localities of these shells in all the towns in the county, which border upon the lake; and one of these in Colchester, is about two miles east of Mallets bay, and more than 200 feet higher than the lake. The shells most common in this formation are the *Sanguinolaria fusca*, Fig. 41, and *Saxacava rugosa*, Fig. 42. (These are the figures referred to on page 41.)

(41)



(42)

*Sanguinolaria fusca.**Saxacava rugosa.*

Chittenden county exhibits more indications of recent igneous action than any other county in the state. These consist of greenstone and feldspathic dikes, of which more than 50 have been traced in the county. Many of these dikes are porphyritic, or amygdaloidal. The direction of the dikes usually makes a large angle with the strike of the rocks, which is nearly from south to north.

The rocks in this county generally have an easterly dip. Along the lake shore the dip varies from  $2^{\circ}$  to  $12^{\circ}$ . In proceeding eastward the dip increases to about  $30^{\circ}$  at the eastern part of the palæozoic series, when it suddenly becomes much greater in the primary strata, and goes on increasing till it becomes vertical in the eastern part of Underhill and Jericho.

*Ores and Metals.* This county has been regarded as somewhat deficient in these; but recently a valuable

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What overlies the palæozoic rocks? What shells are found? What examples given? How far distant from the lake are they found? What indications mentioned?—What are they?—their number?—their direction? What is meant by porphyritic? What way do the rocks dip? How much? What is meant by dip? What ores? Where?

bed of brown iron ore has been opened in Colchester, which affords indications of being extensive. The same kind of ore has been found at several other places in the vicinity. Red oxide of iron and bog ore, are found in small quantities in this town, near Clay point. Iron ore is also found in Milton, St. George, Huntington and Jericho. A small quantity of native copper has been found in Colchester, filling minute seams in siliceous limestone, but there are no indications that it exists in quantity.

*Minerals.* These are of no great interest. Beautiful specimens of calcareous spar, are found in the seams of black slate at numerous places along the lake shore. There are localities of claystones in Shelburne and Colchester. Those at Colchester frequently embrace fossil shells. In Shelburne and Colchester are dikes of porphyry.

In Colchester is a bed of jasper, and jaspery iron ore, which furnishes very beautiful specimens.

*Building Stone.* The rocks in this county are not, in general, of the kinds most suitable for building stone. The red sandrock formation, in several places, affords a good and handsome building stone, and it is extensively quarried in Burlington, for underpinnings and basements of buildings. It is a difficult stone to hammer into good shape, and is, therefore, not much used for walls of buildings. There are some strata in the talcose formation of the eastern part of the county, particularly in Jericho and Westford, which are easily wrought, and make very good door steps and the like, but that formation, embracing more than half the county, is, generally, a very poor building stone.

*Clay and Sand.* The clay and sand of the pleistocene formation in this county, are in many places, combined in the right proportion to make bricks, without the addition of any other material. That is the case at the

What is said of minerals?—of building stone?—of sand and clay? of the soil?

extensive brick-yard in Burlington, at the foot of Winooski falls.

*Soil and Productions.* The soil is various. The intervals along the rivers are rich and productive, and in places, as at Richmond, Colchester and Burlington, extensive and beautiful. In Milton, Colchester, Essex, and Burlington are extensive tracts of sandy plain, which were originally covered with pitch, yellow and white pines. These plains generally lie a little more than 200 feet above the level of the lake. When cultivated without manure, these plains produce little beyond a scanty crop of rye; but when well supplied with muck, lime and other manures, they are found to yield very good crops of corn, potatoes, &c. The higher lands in the eastern part of the county, are rich and productive, but not so easily cultivated. They are well adapted to the production of grass, for hay, and pasturage, and support some very good dairies.

The statistics of 1840 were as follows:—

Horses,	-	-	4,231	Rye, bush.	-	31,570
Cattle,	-	-	21,142	Buck wheat, "	-	11,575
Sheep.	-	-	110,774	Indian Corn, "	-	119,087
Swine,	-	-	25,310	Potatoes, "	-	522,792
Wheat, bush.	-	-	29,502	Hay tons,	-	56,357
Barley, "	-	-	1,305	Maple Sugar, lbs.	-	177,343
Oats, "	-	-	131,799	Wool, "	-	215,019

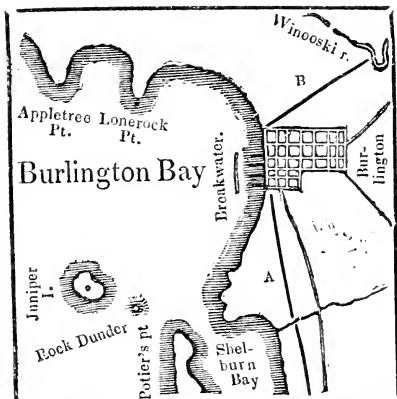
*Pursuits.* The people are mostly employed in agriculture. In 1840, there were 136 engaged in commerce, and 1027 in manufactures and trades, but the number has greatly increased since that time.

*Manufactures.* The most important factories are, that for the manufacture of window glass in Burlington, and the cotton and woollen factories at Winooski Falls. The latter is an extensive establishment and

---

sandy plains? how high are they? how made fertile? what is said of the eastern part? How many horses in 1840 &c? How are the people employed? What factories are mentioned? What is said of villages?—of Burlington?—the

makes cloths, which are unsurpassed by any made in the United States.



*Villages.* These are all small with the exception of Burlington, which is the largest village in the state, and is delightfully situated on Burlington bay. The population of the village of Burlington is about 4000, and that of the whole town about 6000. The rail roads which centre here, and the facilities for communication through the lake, give this place advantages over every other town in Vermont. The public buildings are the University, academy, court house and six churches. The Central rail road (B) and Southern rail road (A) meet and terminate in this village.

*Education.* The university and a female seminary are situated in Burlington, and there are incorporated academies in Jericho, Hinesburgh and Burlington, and several flourishing private schools of a high order in different parts of the county. The county is divided into 170 school district for the support of primary schools, in 53 of which there are 3,542 scholars, or about 68 to a district.

public buildings? railroads? of education? How many school districts?



*History.* The first civilized establishment within the present limits of Chittenden county, was a block house, erected at Winooski falls in Colchester, in 1773, by Ira Allen, and Remember Baker. The next year, 1774, settlements were commenced along this river in Burlington, Colchester, Williston and Jericho, and also in Shelburne and Charlotte, but these settlements were all abandoned in 1776. In 1783, at the close of the war, the former settlers returned, and many others established themselves in this county, and this may be regarded as the date of the first permanent settlement.

This county for a while formed a part of Addison county, and the towns of Addison and Colchester were half shires, and the courts sat alternately at each. Chittenden county was incorporated in 1787, and for a time embraced most of the territory now included in the counties of Grand Isle, Franklin, Lamoille and Washington. Since 1810 the limits of this county have been but little changed, the township of Mansfield only having been detached from it.

Chittenden county has never been the theatre of any very important military operations. During the last war with great Britain, Burlington was a military post and several thousand troops were stationed there for a considerable time.

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What was the first establishment in the county ? When ? What was done next year ? when were they abandoned ? When did the settlers return ? Of what did the co. form a part ? What did it for a time embrace ? How long confined nearly to its present limits ? What is said of military operations here ?

## V. ESSEX COUNTY.

Incorporated Nov. 5, - 1792	Number of towns, - - - 17
First settlement, - - - 1764	Square miles, - - - - 620
Population in 1840, - - 4226	Population to square mile, 7

## TOWNS.

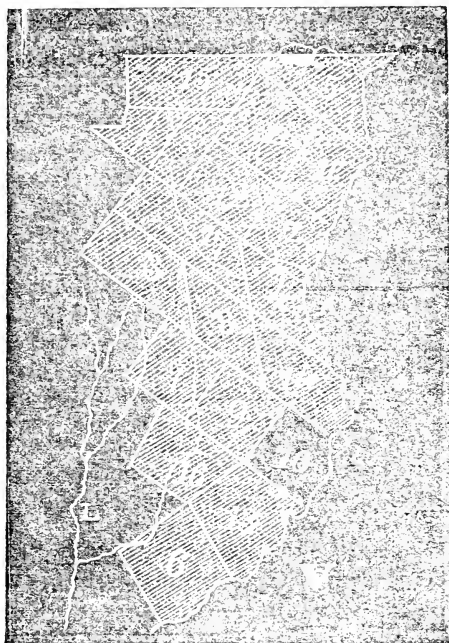
Towns.	Chartered.	Settled.	Organized	Pop. in 1840.	Sq. miles	Pop. to sq. mile.	Gr. List, 1837.
1. Averill,	June 29, 1762			11	36	$\frac{1}{2}$	
2. Bloomfield,	June 29, 1762			179	36	5	\$421
3. Brighton,	June 13, 1781	1823	1832	157	36	$4\frac{1}{2}$	313
4. Brunswick,	Oct. 13, 1761	1780		130	23	4	487
5. Canaan,	Feb. 26, 1782	1785		378	32	12	916
6. Concord,	Sep. 15, 1781	1788	1794	1,024	47	22	2,057
7. E. Haven,	Oct. 22, 1790			79	36	2	286
8. Ferdinand,	Oct. 13, 1761				23	0	
9. Granby,	Oct. 10, 1761		1821	105	30	3	228
10. Guildhall,	Oct. 10, 1761	1764	1785	470	30	16	1,083
11. Lemington	June 29, 1762			124	36	$3\frac{1}{2}$	321
12. Lewis,	June 29, 1762				36	0	
13. Lunenburg	July 5, 1763	1770	1781	1,130	46	$24\frac{1}{2}$	1,703
14. Maidstone,	Oct. 12, 1761	1770		271	27	10	551
15. Norton,	Mar. 8, 1787				36	0	
16. Victory,	Sep. 6, 1781			140	36	4	287
17. Wenlock,	Oct. 13, 1761			28	34	1	
Gores.	- - -	- - -	- - -		34	0	
				4,226	620	7	8,653

*Situation.* Essex county is situated in the extreme north eastern corner of the state, and borders on Canada and Connecticut river.

*Boundaries.* It is bounded on the north by Canada, on the east and south by Connecticut river, and on the west by Caledonia and Orleans counties.

*Extent.* Its length from north to south is about 45 miles, and its width from east to west 23 miles, having an area of 620 square miles. It is divided into 17 townships and 3 gores.

When was Essex county incorporated?—settled?—population?—towns?—square miles?—population to a square mile? Which town was first settled?—most populous?—wealthiest?—unsettled?—most thickly settled? How is Essex county situated? How bounded? What its extent in square miles?—number of towns? How many unsettled?



A Connecticut River. L Passumpsic River.

*Shire Town.*—Guildhall.

*Surface.* The surface of this county is very broken. It consists to a great extent of steep hills and mountains and narrow vallies occupied by swamps or ponds. None of the mountains rise to a very great height. Concord, Lunenburg and a narrow strip next the river in the towns above, are the most feasible portion for settlement and most settled.

The following heights above lake Champlain, are taken from Dewit Clinton's Survey of canal routes.

What the shiretown? What said of the surface?

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Knowlton's lake, Brighton,	-	-	-	1001.
Spectacle pond,	"	-	-	1004.
Summit level,	"	-	-	1008.
Nulhegan pond. Wenlock,	-	-	-	991.
Junction of Nulhegan, Bloomfield,	-	-	-	978.
Mouth of Nulhegan,	"	-	-	711.
Guildhall Falls. (head) Guildhall.	-	-	-	653.
Twenty miles Rapids, (head) Lunenburgh,	-	-	-	640.

---

*Streams.* The eastern part of the county is watered by numerous tributaries of the Connecticut, which are mostly small. The most important of these is Nulhegan river. The western parts are watered by Moose river, and the head branches of Clyde river, and Coatacook river, which runs north into St. Francis river.

*Springs.* In the town of Brunswick, there is a spring which is somewhat celebrated, and resorted to both as a curiosity and for the cure of diseases. The spring is large and issues from the precipitous bank of Connecticut river at a height of perhaps 80 feet above that stream, the entire height of the bank being at this place near 200 feet. Upon the top of this bank lies a natural pond covering 25 acres, separated from the channel of the Connecticut by a gravelly ridge not more than a rod or two in width, and perhaps 15 feet higher than the bed of the pond. The pond receives a small stream, but has no visible outlet. The spring in the bank is probably the outlet of the pond. If so, it is very remarkable that while the waters of the pond are sweet and pure, those of the spring are strongly impregnated with sulphuretted hydrogen, and other substances which give them a disagreeable taste and smell.

*Ponds.* Ponds are numerous in this county, but many of them are in unsettled parts and little known. The most important and best known are Knowlton's lake in Brighton, Leed's pond in Canaan, Neal's pond in Lunenburgh, and Miles and Hall's ponds in Concord.

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What is said of the streams?—What spring mentioned? Describe its situation  
What said of ponds?

*Geology.* The rocks of the central parts of this county are mostly granite. In the northern parts extending into Canada, the rocks are a kind of silicious slate. In the eastern parts granite, mica slate and quartz rock abound; while in the southern part chlorite or talcose slate, is the prevailing rock. In this part near Connecticut river are vast accumulations of granite boulders.

*Dikes.*—One of the most remarkable dikes observed in this county, is in the town of Concord. It is in the talcose slate, is about 6 feet wide and has been traced, nearly in a straight line, about 3 miles in a direction north  $32^{\circ}$  east. It has a light color and appears like a magnesian limestone.

*Ores and Minerals.* This county has been less thoroughly explored than any other in the state, and, consequently, less is known respecting its mineral productions. Iron ore has been noticed in several places, but no extensive deposits of good ore have been found. There is in Brighton a considerable bed of sulphuret of iron suitable for making copperas.

In Maidstone, beneath a bed of muck there is a small deposit of infusorial silica. The shields of 9 or 10 different species of infusorial animalcules have been recognized in this deposit, and also the fossil pollen of pine and other trees.

*Soil and Productions.* With the exception of narrow tracts along Connecticut river, and a few patches in other parts, the soil is hard and gravelly, and not very productive. Statistics of 1840.

Horses,	-	-	1,207	Swine,	-	-	3,639
Cattle,	-	-	6,837	Wheat, bush.	-	-	11,611
Sheep,	-	-	14,188	Barley, "	-	-	2,223
Oats, bush.	-	-	46,485	Potatoes, "	-	-	235,180
Rye, "	-	-	1,537	Hay, tons,	-	-	13,167
Buck wheat, bush.	15,070			Maple Sugar, lbs.	99,385		
Indian Corn, "	-	-	6,709	Wool, "	-	-	23,695

What are the rocks in the central part? northern?—eastern?—southern? What dike is described? What is a dike?(70) What is said of ores?—of infusorial deposit?—of soil? How many horses, cattle? &c. What the chief pursuit?—

*Pursuits.* Agriculture is the chief pursuit. In 1840, there were 9 engaged in commerce, 90 in trades and manufactures and 18 in the learned professions.

*Villages.* The villages in this county are all very small. Guildhall, Concord and Lunenburg are the most considerable. Guildhall is the *shire town*.

*Education.* There are in this county 54 school districts, in 20 of which there are 630 scholars.

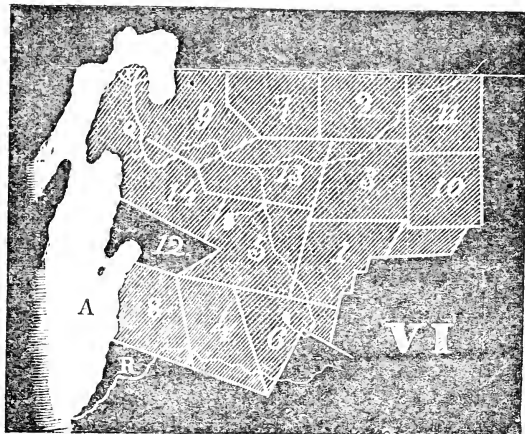
*History.* The first settlement was made in this county in the lower part of Guildhall, in 1764, by David Page, Timothy Nash and George Wheeler. The lands on which they settled were then supposed to be in Lunenburg. The first settlers suffered severe privations and hardships. They brought their provisions in canoes from Northfield, Mass., a distance of 150 miles, and during the revolution they were constantly annoyed by Indians and Tories, who killed their cattle, plundered their houses and carried several of the inhabitants into captivity.

## VI. FRANKLIN COUNTY.

Incorporated, Nov. 5, - - - 1782	Number of towns, - - - 14
First settlement, - - - 1783	Square miles, - - - 549
Population in 1840, - - 24,531	Pop. to the square mile, - - 44½

### TOWNS.

Towns.	Chartered.	Sett. Org. def. mcs.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Gr. List 1847.
1. Bakersfield	Jan. 25, 1794	1789	1,258	42	30	2,940
2. Berkshire	June 22, 1781	1772-1794	1,718	36	50½	3,238
3. Enosburgh	May 15, 1789	1797-1798	2,022	36	56	3,372
4. Fairfax	Aug. 18, 1763	1783-1787	1,918	36	53	3,538
5. Fairfield	Aug. 18, 1763	1788-1790	2,448	60	41	4,066
6. Fletcher	Aug. 29, 1781	-	1,914	36	53	2,135
7. Franklin	Mar. 9, 1789	1789-1793	1,410	36	39	2,498
8. Georgia	Aug. 17, 1763	1784-1788	2,106	36	58½	4,361
9. Highgate	Aug. 17, 1763	-	2,292	39	76	4,375
10. Montgomerly	Oct. 8, 1789	1793-1802	541	36	15	1,278
11. Richford	Aug. 21, 1780	1797-1799	911	36	25½	1,306
12. St. Albans	Aug. 7, 1763	1785-1788	2,702	36	78	8,785
13. Sheldon	Aug. 18, 1763	1790	1,734	36	48	3,542
14. Swanton	Oct. 17, 1763	1787-1790	2,312	42	55	4,330
Avery's Gore	- - -	- - -	35	15	2	-
			24,531	549	44½	49,764



A Lake Champlain. Q Missisco River. R Lamoille River.

*Situation.* Franklin county is situated in the north-western part of the State, bordering on Canada and lake Champlain.

*Boundaries.* It is bounded on the north by Canada, east by Orleans and Lamoille counties, south by Lamoille and Chittenden counties, and west by Missisco bay and lake Champlain.

*Extent.* The extent of the county from east to west is about 34 miles, and from north to south about 26 miles. It is divided into 14 townships and one gore.

*Shire Town.* St. Albans.

*Surface.* The northwestern part is generally level; the central parts are gently diversified with swells, hills, and vallies, while the eastern parts rise into mountains. Jay peak, which is on the east line of the county, is the most lofty summit, and has been found by barometrical measurement to be 3928 feet above lake Champlain.

How is Franklin co. situated?—bounded?—extent?—shire town?—square miles?—number of towns? what is said of the surface?—of Jay peak? How watered? what

*Rivers.* This county is watered principally by Missisco river and its branches. Lamoille river waters a portion of the southern part. The other principal streams are Trout river, which joins the Missisco at East Berkshire and Black creek, which enters it in Sheldon. These and many of the smaller streams afford numerous and excellent mill privileges. The most important water falls, and greatest amount of water power, are in Missisco river in Swanton and Highgate.

*Springs.* There are several sulphuretted hydrogen springs in the western part of the county, the most noted of which is in Highgate. Here excellent accommodations are provided, and, during the summer, it is a place of considerable resort for invalids, who are often benefitted by the change of air, agreeable scenery and the medicinal waters.

*Ponds.* There are several natural ponds in the county, the most important of which are Smithfield pond, or Fairfield lake, in Fairfield, and Franklin pond in Franklin. The former is about three miles long and discharges into Black creek. The latter is about the same size and discharges into Pike river, which is formed in Berkshire, and empties into the north end of Missisco bay in Canada. Metcalf pond in Fletcher is about a mile long and half a mile wide.

*Curiosities.* Over a stream in Georgia, called Stonebridge brook, there is a natural bridge which is about 12 feet wide. In many places the cliffs, at a considerable distance from the lake and many feet above it, show the action of the arm of the sea that once occupied the valley of lake Champlain, they having potholes evidently worn out by the action of waves. One of these in the north part of Highgate is in the form of a cave extending into the rocks in a horizontal direction about 80 feet.

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falls? springs?--what is said of Highgate spring? What ponds? What natural bridge?--potholes?--cave?--what the rocks near Highgate springs?--on the



*Geology.* In the vicinity of the medicinal spring in Highgate is a patch of Trenton limestone containing fossils, but the rock which forms the shore of the lake through most of this county is black slate in which no fossils have been found. In many places it comes out in thin wedge form and laminated masses, which are so highly glazed as to give them the appearance of anthracite coal. This is particularly the case in the western part of Highgate, and, deceived by this appearance, persons have expended a considerable amount there in making excavations with the vain expectation of finding coal.

Adjacent to the black slate, and between it and the red sandrock formation, are beds of very pure limestone. These, in Georgia, St. Albans, and Swanton, are burned into very excellent quicklime. In the latter town it is sufficiently compact to be sawed for marble, which takes a good polish, but is rather deficient in strength.

East of this limestone the red sandrock series extends from south to north through the county, but has been subjected, in many places, to very great disturbance. In some places, as in Georgia and St. Albans, the stratification, and dark red, or chocolate hue, is well exhibited; but in other localities, particularly in Highgate, it appears as a light gray quartz rock, in some places stratified and arenaceous, but in others exceeding compact and fine-grained, approaching almost to chalcedony. In Highgate, about half a mile from Sax's mills on Rock river, the red sandrock, which is there well characterized, contains great numbers of fossils, though they are somewhat obscure. They appear to consist of the shields of trilobites.

All to the eastward of this series, which occupies

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shore?—What is said of the glazed slate?—what limestone? What said of it? of the red sandrock?—what fossils in it?—where?—what the rocks to the eastward?—what the strike and dip of the strata? Where is there a synclinal axis?

only the towns bordering on the lake, may be denominated a region of talcose slate. In this there is, however, considerable variety, and in some places it would be called clay slate, in others mica slate, in others chlorite slate and in others quartz, but far the greater portion would be called talcose slate. Through the west part of Richford and Montgomery there is a narrow range of plumbaginous slate.

All the rock in the county have their strike, averaging about  $20^{\circ}$ , to the east of north. Through the central parts of Berkshire, Enosburgh and Bakersfield, there is a synclinal axis, the strata being there vertical; on the west side of which all the strata dip to the east, and on the east side of which they dip to the west; those lying nearest the axis having the greatest dip.

There is no limestone found in the county to the eastward of the towns bordering on the lake, excepting two small beds of white saccharoid limestone—one in Bakersfield, and the other in Richford.

*Ores.* Iron ore is found at several places in this county. Red hematite is found in considerable quantities in Fairfield, Sheldon, and Berkshire, the localities lying nearly in the direction of the strike of the rocks. There were formerly works at Sheldon where this ore was wrought. Bog ore has also been obtained in considerable quantity in Highgate near the Springs.

*Minerals.* Epidote abounds in the rocks in the central parts of Berkshire. Sulphate of barytes and actynolite are found in Richford; and fossil leather and mountain cork are found in Swanton.

*Soil and Productions.* The soil of this county is in some parts light and sandy, but is generally of very good quality. A large part of Highgate and Swanton was originally covered with excellent pine timber.

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What is a synclinal axis? What limestone in the eastern part? What ores are found? What minerals? What is said of the soil?—of pine timber?—of fruit

Most kinds of grain, grass, and culinary vegetables flourish well in all parts of the county, but for some reason, not very well understood, fruit trees do not succeed at all in the valley of Missisco river.

The following were the statistics in 1840:—

Horses, - - -	4,427	Rye, bush.,	10,144
Cattle, - - -	26,965	Buckwheat, “ -	9,603
Sheep, - - -	87,385	Indian Corn, “ -	65,534
Swine, - - -	8,935	Potatoes, “ -	709,396
Wheat, bush., -	48,686	Hay, tons, -	61,262
Barley, “ -	599	Maple sugar, lbs.,	400,775
Oats, “ -	94,700	Wool, - “ -	225,802

*Building Materials.* There are some pretty good quarries of building stone in the western part of the county, but the talcose slate formation of the central and eastern parts, furnishes few good building stone. Clay and sand suitable for bricks are found in various parts of the county. In Fairfax there is a bed of crystalline siliceous sand, suitable for the manufacture of glass.

*Pursuits.* The people are nearly all engaged in agriculture. It appears that, in 1840, the number of persons engaged in commerce was 81, in manufactures and trades 636, and in the learned professions 106.

*Villages.* St. Albans is the shire town, and St. Albans village is the most important in the county. Besides the county buildings it contains an academy, a congregational, an episcopal, and a methodist church, a bank, and the usual variety of taverns, stores, and mechanics shops. The other most considerable villages are Swanton, Highgate, Sheldon, East Berkshire, and St. Albans bay.

*Education and Schools.* The number of school districts is 195, in 185 of which the number of children, be-

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trees? How many horses?—cattle? &c. what is said of building materials?—of clay and sand?—of pursuits?—of villages?—of schools?— What semina-

tween four and 18 years of age, are 8514, being an average of 46 scholars to a district.

There is a flourishing academy at St. Albans, and two flourishing seminaries in Bakersfield.

*History.* Previous to the conquest of Canada by the English, in 1760, there was a settlement of French and Indians at Swanton Falls, consisting of about 50 huts. They had cleared some land on which they raised corn and vegetables, and had built a church and sawmill, and they continued to have possession here up to the close of the revolution.

The first permanent settlement within the county was made, in 1783, by Broadstreet Spafford, and his two sons, Nathan and Asa. They emigrated from Piermont, N. H., and settled in the town of Fairfax.

There was a settlement commenced in St. Albans, about the beginning of the revolution, but it was soon abandoned on account of the war, and the settlers did not return to that town till 1785. The first permanent settlement of Georgia was effected in 1784.

When Addison county was formed in 1785, it embraced all the territory on the west side of the Green Mountains to the northward of Rutland county. After the formation of Chittenden county, the territory to the northward of Addison county was embraced in that, till 1792, when the present county of Franklin was formed, and restricted to very nearly its present limits.

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ries mentioned? What early settlement is mentioned? When and where was the first permanent settlement? When was Georgia settled?—St. Albans? In what counties was this formerly embraced? When incorporated as a separate county?

## VII. GRAND ISLE COUNTY.

Incorporated, Nov. 9.	-	1802	Number of towns,	-	5
First settlement,	-	1782	Square miles of land,	-	77
Population in 1840,	-	3,883	Population to square mile,	-	50

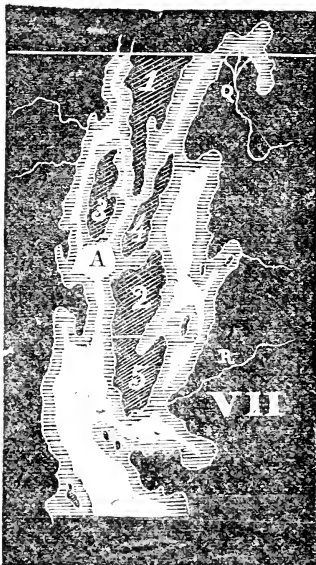
## TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized.	Pop. in 1840.	Sq. miles	Pop. to sq. mile.	Gr. List. 1847.
1. Alburgh,	Feb. 23, 1781	1782	1792	1,344	30	44½	\$2,533
2. Grand Isle,	Oct. 27, 1779	1783		724	14	52	2,119
3. Isle la Motte,	Oct. 27, 1779	1785		435	7	62	689
4. North Hero,	Oct. 27, 1779	1783	1989	716	11	65	1,589
5. South Hero,	Oct. 27, 1779	1783		664	15	44	2,318
				3,883	77	50	9,278

*Situation.* Grand Isle county is situated in the extreme north western corner of the state, and, with the exception of the town of Alburgh, consists of islands in lake Champlain.

*Boundaries.* It is bounded on the north by Canada, on the east by Missisco bay and lake Champlain, and on the south and west by lake Champlain.

*Extent.* The extreme length of this county from north to south, is about 28 miles, and its greatest width about 5 miles. The area, exclusive of water, is only about 77 square miles. It is divided into 5



5A Lake C. Q Missisco R. R Lamoille R.

When was Grand Isle County incorporated?—settled?—population?—Number towns?—square miles?—population to a square mile?—first settled town?—most populous?—most wealthy?—the last settled?—How is the county situated?—

townships, but the amount of land is only a trifle more than is contained in two ordinary townships of six miles square.

*Shire Town.*—North Hero.

*Islands.* Besides the three large islands called Grand Island, North Hero and Isle la Motte, there are several smaller ones lying to the south and east of these. Providence island, Savage's island and Butler's island, are among the most important of these, and each contains 200 acres or more of land. Providence island is near the shore of South Hero. They, who escaped from the steamboat Phoenix, when it was burned on the 5th of September, 1819, landed on this island.

*Surface.* The surface of this county is level and low, not rising in any part more than about 200 feet above the level of the lake. There are some tracts of land so nearly on the level of the lake, as to be too wet and swampy to admit of cultivation. One tract of this kind extends north and south through Alburgh, another through South Hero, and another, running east and west, through the Isle la Motte.

*Streams.* These, as might be expected, are all very small—no one of them sufficiently large to be a permanent mill stream. There has been one gristmill, which did considerable business, and one or two windmills, but the grain raised here is mostly floured out of the county.

*Springs.* There are several springs in this county which are impregnated with sulphuretted hydrogen and iron, and are regarded as medicinal. Two of these are in South Hero, and one in Alburgh. The latter has had some celebrity, and been a place of considerable resort for invalids. The water is undoubtedly efficacious in cutaneous affections, and probably in some others.

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bounded?—extent?—shire town?—what islands?—What is said of Providence island?—of the surface of the County?—elevation?—swamps?—streams?—springs?

*Geology.* All the rocks in this county belong to the Champlain group, already described.

The rock formation of the Isle la Motte, is made up almost wholly of what we have denominated Isle la Motte limestone, covered to some small extent in the south eastern and north eastern parts with Trenton limestone. Near the middle of the east side of the island is an extensive and valuable quarry of fine black marble. No where else in the state can there be found within the same space, so accessible and so large quantities of limestone, and so suitable for all the purposes of sawing, polishing, hammering, and rough masonry, and for the manufacture of quicklime, as exists in the south half of the Isle la Motte. This same kind of limestone occupies a small space along the west side of North and South Hero. To the east of this, it is succeeded, on South Hero and Grand Isle, by Trenton limestone, which extends about half way across those towns. The rocks of the eastern parts of these towns, and of nearly the whole of North Hero, and the whole of Alburgh, are all either Utica slate, or Hudson river shales.

*Dikes.* Greenstone dikes are not uncommon in Grand Isle and South Hero. They cut across the limestone, and slate formation in an east and west direction, running very nearly in straight lines, and continuing very uniform in width. From one of these in Grand Isle, the more perishable rock on each side, has been removed or worn away, so as to leave the dike, which is about 18 inches wide, rising like a wall above the general surface of the ground. It was noticed by the early settlers, some of whom thought it to be a work of art. The perfect adaptation of every portion of the dike to its place, they supposed, however, to indicate skill and in-

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rocks?—rocks on Isle la Motte?—of black marble?—of south end of Isle la Motte?—What east of trenton limestone?—What is said of dikes?—of one in Grand Isle?—of marl?—of the bed in Alburgh? What is said of calcareous spar?

telligence surpassing that of the present race of Indians.

*Marl.* In this county are several beds of excellent shell marl. One of these in the northeast part of Grand Isle is more than 100 feet above the lake. Another, and the most important one in the county, is in Alburgh. It is situated on the north line of that town, extending a little over it into Canada, and is but little elevated above the lake, and yet sufficiently so to be effectually drained. The bed extends over a level tract of about 60 acres. The marl rests upon a bed of fine blue clay, is where it has been opened, 6 feet deep, and is covered by a layer of rich black muck 5 feet deep, the surface of which is cleared and cultivated.

*Minerals.* The shales, or slates in this county abound in seams and beds of calcareous spar, which afford fine specimens, which are, for the most part, white, but in some places of a beautiful light blue color. They also furnish nodules and seams of sulphuret of iron, the decomposition of which, in sheltered places, often produces an efflorescence of copperas and alum. Fine specimens of hexaedral rock crystals are also found in this slate on the east shore of Grand Isle. This slate also abounds in some parts in large calcareo-argillaceous concretions made up of concentric laminae. This is particularly the case in the eastern part of Alburgh and north east part of North Hero.

*Fossils.* These are exceedingly numerous and abundant in the Isle la Motte limestone, particularly in the central part of the Isle la Motte. Columnaria, maclureas, and orthoceras are the largest and most conspicuous of these fossils. The Trenton limestone also is in places almost entirely made up of fossils. This limestone, in the southern part of South Hero, consists of small bivalve shells, and, as it answers very well for

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—of rock crystal?—of fossils?—what are some of the largest?(p. 62)—What is said of the Trenton limestone?—What is it called?—what shells abound in the su-



hearths and fire places, it is there called *fire stone*. In the Utica slate trilobites and graptolites are found, but sparingly.

The superficial deposits in many places abound in marine shells, such as are now living on the Atlantic coast of New England. The most common species are the *Sanguinolaria fusca*, *Saxacava rugosa* and *Mya arenaria*. These are found on the highest land in the county, and are abundant on some of the small islands in the eastern part.

The marl beds are composed of fresh water shells such as are now living in the lake and other waters of the State. The most common genera of these are *Planorbis*, *Limnea*, and *Cyclas*.

*Soil and Productions.* The soil of this county is of a very dark color, being formed of disintegrated slates and limestones united with vegetable mould, and in many places with a mixture of marine fossil shells. It is very rich, and produces most kinds of grain and vegetables in abundance. In South Hero and Grand Isle considerable attention has been given to the cultivation of fruits; and these towns produce apples, plums and cherries of very fine quality.

Statistics of 1840:—

Horses,	-	-	1,161	Indian Corn, bush.,	13,816
Cattle,	-	-	5,463	Rye,	" 9,504
Sheep,	-	-	27,451	Buckwheat,	" 9,216
Swine,	-	-	3,179	Potatoes, -	- 76,408
Wheat, bush.,	-	-	21,430	Hay,	tons, 8,593
Barley, "	-	-	1,655	Maple Sugar, lbs.,	34,478
Oats, "	-	-	43,430	Wool,	" 57,546

*Pursuits.* The chief employment is agriculture. On the Isle la Motte the quarrying of marble and building stone is an important business. In 1840 there were 16

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perficil deposit?(p. 47.)—in the marl?(p. 51.)—What is said of the soil?—of fruits?—How many horses? &c.—What is said of the pursuits?—villages?—What is

engaged in commerce, 84 in manufactures and trades, 17 in navigation, and 19 in the learned professions.

*Villages.* There are clusters of buildings at several places in the county; but they are all very small and hardly deserve the name of villages. North Hero is the shire town.

*Schools.* The district schools are the only permanent schools in the county. There are 27 school districts in 15 of which there are 610 scholars between 4 and 18 years.

*History.* More than 100 years ago, while the French had possession of the lake, they erected a windmill on what is now called Windmill point in Alburgh. Before the revolutionary war, while the British possessed the lake, they are said to have had lime kilns, and to have burned lime at what is now Fisk's quarry, on the Isle la Motte. During the revolution the British established a military post on North Hero which was not given up to the United States till 1793.

The lands of the county were granted by the government of Vermont just before the close of the war. The two largest islands in the county were granted at the same time to Ethan Allen, Samuel Herrick, and others, who had distinguished themselves in sustaining the independence of the State and of the United States, and as a compliment to these worthies the islands were called the Heros. In 1788 the Heros were divided into two towns, North Hero and South Hero. In 1798 South Hero was divided into South Hero and Middle Hero. The name of Middle Hero has since been changed to Grand I.

The first permanent settlement was made about the close of the revolution. Col. Ebenezer Allen, the hero of Mount Defiance, was one of the first settlers. He settled on the southern extremity of South Hero, which is now known by the name of Allen's point.

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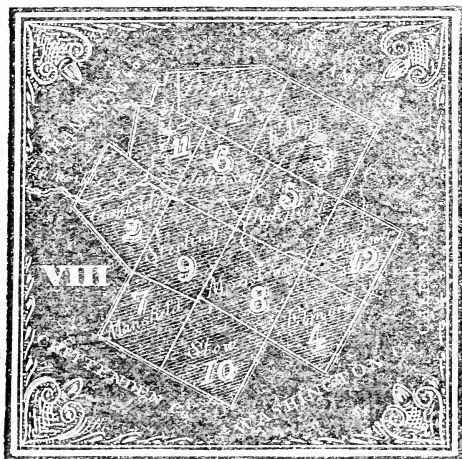
said of schools?—When did the French take possession here?—What did they do?—What was done by the English?—What is said of the quartz?—Why called i.e. rocks?—Where was the first permanent settlement made?—What is said of Col. Ebenezer Allen?—What diseases were prevalent?

## VIII. LAMOILLE COUNTY.

Incorporated, October 26, 1835	Number of towns, - - -	12
First settlement, - - - 1783	Square miles, - - -	431
Population in 1840, - - 10,475	Pop. to square mile, - - -	24½

## TOWNS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1840.	Sq. mile.	Pop. to q. mile.	Gr. List. 1847.
1. Belvidere,	Nov. 4, 1791	1800		207	36	7	\$ 416
2. Cambridge	Aug. 13, 1781	1783	1785	1,750	47	37½	4,694
3. Eden,	Aug. 23, 1781	1800	1802	703	57	12½	1,155
4. Elmore,	Aug. 21, 1781	1790	1792	476	36	13	851
5. Hydepark,	Aug. 27, 1781	1787	1791	1,080	36	30	2,170
6. Johnson,	Jan. 2, 1792	1784		1,410	36	39	2,226
7. Mansfield,	June 8, 1763			223	28	8	425
8. Morriston,	Aug. 24, 1781	1790	1796	1,502	36	42	3,654
9. Sterling,	Feb. 25, 1782	1799		193	36	5½	428
10. Stow,	June 8, 1763	1783	1797	1,371	36	38	3,879
11. Waterville,	Nov. 15, 1724	1782		619	19	32	1,176
12. Wolcott,	Aug. 23, 1781			910	36	25½	1,651
				10,475	431	24½	22,705



When was Lamoille county incorporated?—settled?—population?—number of towns?—square miles?—population to square mile? Which town was first settled?—most populous?—oldest settled?—most widely settled?

*Situation.* Lamoille county is situated a little to the north of the centre of the State, and is one of the only two counties not having its boundary in part coinciding with that of the State.

*Boundaries.* It is bounded northwest by Franklin county, northeast by Orleans county, southeast by Washington county, and southwest by Chittenden county.

*Extent.* It extends about 27 miles from east to west, and 26 miles from north to south, containing 431 square miles. It is divided into 12 townships.

*Shire Town.* Hydepark.

*Surface.* A large part of this county is uneven, and some portions of it mountainous. The most lofty summits are the Mansfield mountains, the highest in the State, and Sterling Peak. The latter is about 3700 feet above the lake. Eden mountain and Elmore mountain are conspicuous elevations. Stow and Morristown, although surrounded by mountains, are two of the most level townships in the State.

*Streams.* With the exception of Stow and Mansfield, whose waters pass by Waterbury river into the Winooski, the county is watered by the river Lamoille and its branches, which furnish numerous sites for mills, and an abundance of water power. The principal streams received by the Lamoille in this county are, in Cambridge, North branch on the north side, and Brewster's river and Seymour's brook on the south side; in Johnson, Little North branch, and in Wolcott Green river and Wild branch, all on the north side.

*Springs.* There is a mineral spring in Wolcott.

*Ponds.* Natural ponds are very numerous. There are not less than 12 in the town of Hydepark. Among the most important ponds in the county are North pond

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How is Lamoille co. situated?—bounded?—extent?—shire town?—the surface? What summits are mentioned? What towns are level? What rivers and streams?—springs?—ponds?—what are the rocks?—what is said of the slate?

in Eden, which is two miles long, and Mead's pond in Elmore, which covers about 300 acres.

*Geology.* The rocks in this county are all primary, and nearly all of them are talcose slate. The slate in some parts is considerably chloritic, and should perhaps be called chlorite slate, and in other parts, as in Sterling and Mansfield, much of it would be called mica slate. All the rocks in this county have a very steep dip, and in parts of Elmore, Hydepark and Morristown the dip is vertical, and their strike is from north  $24^{\circ}$  east to south  $24^{\circ}$  west. In the township of Stow the average dip of the rocks is about  $70^{\circ}$  east.

There is a range of steatite, or soapstone, passing through the county. It shows itself in Eden and in Stow. Steatite is also found on Sterling mountain and in Waterville. At the latter place it is quarried and wrought to considerable extent. It is easily wrought, and is employed for ovens, furnaces, &c., as a fire stone, and is found to answer the purpose well.

Serpentine rock, as is common in some other parts of the State, is found here in connexion with the steatite.

There is a small bed of whitish limestone found in Johnson, in the talcose slate formation, from which lime has been made, and another bed of white saccharoid limestone in Waterville. These are the only localities of limestone known in the county, and no beds of shell marl have been discovered.

*Ores.* Iron ore of different varieties has been found in several towns in this county; but has been found in greatest abundance and of best quality in Elmore. It is found in this town in irregular veins, lying very nearly in the direction of the strike of the rocks.

In the northeast part of Morristown there is a vein of lead ore (*sulphuret of lead*) or galena. It is in talcose

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How does the slate dip? Where is there steatite?—serpentine?—limestone?—

slate on the summit of a considerable hill. The vein, or bed, runs in the direction of the strike of the slate which N. 15° E. with a nearly vertical dip. It may be traced several rods before it disappears under the soil and drift. The seam which is filled, with the lead and its gangue, is about 18 inches wide at the surface, but increases in width downward, as far as excavations have been made, which is about 10 feet. This lead ore contains a small per cent of silver.

Copper ore has been found in Sterling.

In Hydepark is a very extensive bed of ochre which makes a very good paint.

*Minerals.* Fine talc and actynolite are found in the steatite, particularly at Waterville. Plumbaginous slate is found in Cambridge, which is used for marking as a substitute for plumbago, or black lead.

*Building Materials.* The territory embraced in this county being throughout a region of talcose slate, does not furnish the best material for building stone. Still, stone are found in most parts sufficiently compact for ordinary purposes. Very good clay and sand for brick are met with in several places.

*Soil and Productions.* Several of the towns are broken and mountainous, but in the vallies there are many fine farms, and the soil is of good quality. Cambridge, Stow, and Morristown are excellent farming towns. Stow is one of the most level towns in the State. The following are the statistics of 1840:—

Horses,	-	-	2,567	Rye,	-	-	-	1,604
Cattle,	-	-	16,555	Buckwheat,	-	-	-	763
Sheep,	-	-	40,921	Indian Corn,	-	-	-	28,483
Swine,	-	-	7,287	Potatoes,	bush.,			472,563
Wheat, bush.,	-	-	21,070	Hay,	tons,			29,616
Barley, “	-	-	477	Maple Sugar, lbs.,				295,476
Oats, - - -	-	-	70,727	Wool,	“			85,595

what ores?—where is lead ore found?—What does the lead ore contain?—where is copper ore found?—Where is ochre found?—What minerals are found?—what is said of building materials?—of the soil?—what good farming towns?—How

*Pursuits.* The pursuits are almost entirely agricultural. In 1840 there were 68 engaged in commerce 369 in manufactures and trades, and 49 in the learned professions.

*Villages.* The villages in this county are all small. Cambridge, Johnson, Hydepark, Morrisville, and Stow are the principal. Hydepark is the shire town.

*Education.* The number of school districts is 119, and the number of scholars 3844, averaging  $32\frac{1}{2}$  to a district. Lamoille Academy was incorporated at Johnson in 1832.

*History.* This county has been formed more recently than any other in the State, having been incorporated in 1835, from portions of four previous counties, viz: Washington, Chittenden, Franklin and Orleans.

The first settlement within the county was commenced in Cambridge, in 1783. The next year, 1784, settlements were made in Johnson, and soon after in Hydepark and Wolcott.

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many Horses? &c. What is said of the pursuits?—of villages?—of education? When and of what was this co. formed? When and where first settled?

## IX. ORANGE COUNTY.

Incorporated Feb.	-	1781	Number of towns,	-	17
First settlement,	-	1762	Square miles,	-	185
Population in 1840,	-	27,873	Pop. to the square mile,	-	45½

## TOWNS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Gr. List. 1847.
1. Bradford,	Jan. 25, 1791	1765		1,655	29	57	4,848
2. Braintree,	Aug. 1, 1781	1783	1788	1,232	36	34	2,863
3. Brookfield,	Aug. 5, 1781	1779		1,789	36	49½	4,533
4. Chelsea,	Aug. 4, 1781	1784	1788	1,959	36	54½	4,976
5. Corinth,	Feb. 4, 1764	1777	1780	1,970	36	55	5,336
6. Fairlee,	Sept. 9, 1761	1766	1775	644	20	32	1,906
7. Newbury,	Mar. 18, 1763	1762		2,578	57	45½	7,444
8. Orange,	Aug. 11, 1781	1793	1796	98	36	27½	2,099
9. Randolph,	June 29, 1781		1783	2,674	45	59½	9,157
10. Strafford,	Aug. 12, 1761		1779	1,76	38	46½	5,378
11. Thetford,	Aug. 12, 1761	1764	1768	2,065	41	50	5,339
12. Topsham,	June 17, 1763	1781	1790	1,745	42	41½	3,927
13. Tunbridge,	Sept. 6, 1761	1776	1786	1,811	36	50½	4,738
14. Vershire,	Aug. 3, 1781	1780	1783	1,198	34	35	2,980
15. Wash'ton,	Oct. 25, 1781	1785	1792	1,359	36	37½	3,030
16. W. Fairlee,	Sept. 9, 1761		1797	824	21	40	1,542
17. William'n,	Aug. 9, 1781	1784	1787	1,620	36	45	4,254
				27,873	615	45½	74,350

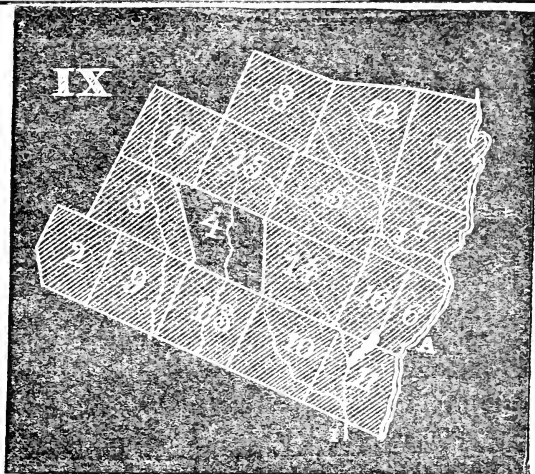
*Situation.* Orange county is situated about midway between the northern and southern extremity of the state, on the east side of the Green Mountains and bordering on Connecticut river.

*Boundaries.* It is bounded on the north by Caledonia and Washington counties, on the east by Connecticut river, on the south by Windsor county, and on the west by Addison and Washington counties.

*Extent.* This county extends 34 miles from east to west and 23 miles from north to south, and contains 615 square miles. It is divided into 17 townships.

When was Orange co. incorporated?—settled?—population?—towns?—square miles?—persons to a square mile?—what town first settled?—first organized?—most populous?—most wealthy?—How is Orange co. situated?—bounded?—extent?—square miles?—towns?





A Connecticut River. I Ompomponoosuc River. J Wait's River.

*Shire Town.* Chelsea.

*Surface.* The surface is generally uneven and hilly, but no where rises into mountains. That branch of the Green Mountain range, which is called the *height of lands*, passes through the western part of the county, but presents no prominent summits.

*Streams.* The streams in this county are numerous, but none of them large. The principal streams in the eastern part are Ompomponoosuc river and Wait's river. Well's river joins the Connecticut, in the northeast corner, but derives its waters chiefly from Caledonia county. The southwestern parts are watered by the 1st, 2nd., and 3rd branches of White river, and the north-western part by Steven's branch, which joins Winooski river in Berlin.

*Falls.* The falls in Wells river at Newbury, in Wait's river at Bradford, and the Ompomponoosuc, at Thet-

shire town?--surface?--streams?--falls?--ponds?--pickers? What is said of

ford, furnish a considerable amount of water power, and there are other good sites for mills in different parts of the county.

*Ponds.* Fairlee lake, lying between Fairlee and West Fairlee is the largest body of water in the county. It is two miles long and three quarters of a mile wide.

In 1809, Samuel Morey, transported some pickerel into the lake, from a pond, in New-Hampshire. Since that time pickerel have multiplied here very rapidly, and they are regarded as of superior quality for the table.

There are other ponds in Newbury, Bradford, &c.; but they are all small.

*Springs.* There are several medicinal springs in this county, the waters of which are impregnated with sulphuretted hydrogen. The springs at Newbury have been longest known, and most celebrated, having been more or less resorted to by invalids, since the first settlement of the country. Other similar springs exist in Tunbridge and Williamstown, which are also favorite places of resort, in the summer season.

*Curiosities.* In Wright mountain in the west part of Bradford, there is an interesting cave in which are several apartments. It is known as the *Devils Den*. In Thetford, there is a pond covering about 9 acres, which is less than ten rods from Connecticut river, but elevated 153 feet above that stream. It has no visible inlet or outlet. It is deep, having been sounded more than 50 feet. It contains perch and dace.

*Geology.* The rocks of the greater part of this county, belong to the talco-mica slate formation. In a small portion of the western part, they are of the talcose-slate formation. Next east of this, through Randolph, Brookfield and Williamstown, in the calcareo-mica slate

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spring? What curiosities? Describe the pond? What is the rock formation? Where is there talcose slate? Clay slate? What is said of the eastern part?—

formation there is an unusually large developement of clay slate. The eastern part of the county is very broken, and next to Connecticut river, there are, in several places, high perpendicular precipices.

The rocks in the northwestern part, and extending thence towards the centre of the county, are granite.

*Ores.* Iron ore has been found in this county in many places, but is known to exist in large quantities only in the state of sulphuret of iron, or *iron pyrites*. The most remarkable bed of this ore, is in the southeast corner of Strafford, and from this bed, which is reckoned inexhaustible, 1000 tons of copperas are annually manufactured for market, where it sells for about \$2 per hundred weight.

Copperas is sulphate of iron. Sulphate of iron is iron combined with sulphuric acid. Sulphuric acid, is sulphur combined with oxygen. Sulphuret of iron is sulphur combined with iron. It is usually of a yellow color, resembling brass, and has sometimes been mistaken for gold, and hence it is often called *Fool's Gold*.

The following is briefly the process of manufacturing copperas at Strafford. The sulphuret of iron is blasted from the bed, and is broken into small lumps and particles, with hammers. It is then thrown into heaps, where it ignites by exposure to air and moisture or is set on fire. The combustion continues about two months, during which time the sulphur combines with the oxygen of the atmosphere, forming sulphuric acid, and this acid combines with the iron, forming sulphate of iron, or copperas. This crude copperas, mingled with earthy matter, is then leached, and the lye evaporated to such a consistency that a large proportion of the copperas will crystalize as the liquid cools. After

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Where is iron ore found? What kind? What is made from it? How much? What is copperas? What sulphate of iron? What sulphuric acid? What is

the crystalization is completed the liquid is drawn off and the copperas dried and packed in casks for market.

Copper ore (sulphuret of copper) is found at Strafford in connexion with the sulphuret of iron in considerable quantities, but in greater abundance and purity farther north in the town of Corinth.

In 1829 a furnace was erected at Strafford for smelting the ore for the copper; but it was not found to be profitable, and after a few years, the business was abandoned. Considerable quantities of the Corinth ore have been transported to Boston.

A specimen of the copper pyrites from Corinth was analyzed by Mr. Olmsted, with the following results.

Copper.	- - - - -	27.28
Iron.	- - - - -	37.91
Sulphur.	- - - - -	33.70
Silica and mica	- - - - -	1.11=100

There is a small vein of lead ore (sulphuret of lead) in Thetford.

*Marl.* There are small deposits of marl in Brookfield, Randolph, and Tunbridge, but the most valuable deposit of marl in the county, and perhaps the most valuable in the state is in Williamstown. It is from 6 to 18 feet deep, and slightly covered with a dry soil.

This marl is white and very pure, yielding by analysis :

Carbonate of lime,	- - - - -	80
Carbonate of magnesia,	- - - - -	42
Silica, with traces of ox. of iron and alumina,	- - - - -	10
Water and organic matter,	- - - - -	55=90.7

Large quantities of very excellent quicklime, are made from this bed. The marl while in a state of paste, is made into the form of bricks, and, after drying is arranged in the kiln, in the manner of arranging bricks for burning, and is then burned by means of a fire placed beneath.

*Minerals.* Kyanite, rock crystal and garnet, are quite

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sulphuret of iron? What does it resemble? Describe the process of making copperas? What is said of copper ore? What was done in 1829? What is said of lead ore at Corinth? What percent of copper? Where is lead found?—marl? of Williamstown bed?—its analysis?—how prepared for quicklime? What min-

common in Thetford, and also beautiful claystones. Mispickel is found in abundance in the west part of Brookfield.

*Building Materials.* Good granite for building stone, is found in various parts of the county, and good clay and sand for bricks are also common.

*Soil and Productions.* The soil of this county is generally of a very good quality, particularly when it is formed by the disintegration of the clay slate and blue limestone, of the calcareo-mica slate formation, which is the case in Randolph, Brookfield and Williamstown. The following are the statistics of 1840:

Horses	-	-	-	6,674	Rye	"	-	-	12,933
Cattle	-	-	-	36,853	Buckwheat, bush.				30,144
Sheep	-	-	-	156,053	Indian Corn, "				120,543
Swine	-	-	-	22,516	Potatoes, "				1,055,379
Wheat, bush.	-			69,565	Hay, tons	-	-	-	73,004
Barley	"	-	-	5,265	Maple sugar, lbs.				420,639
Oats	"	-	-	254,878	Wool, "				311,674

*Pursuits.* The pursuits are generally agricultural. In 1840, there were 132 engaged in commerce, 853 in manufactures, and trades, and 166 in the learned professions.

*Rail Roads.* The Central rail road passes through the western part of the county, and the Passumpsic road through the eastern part.

*Education.* The number of school districts is 273, and the number of children between 4 and 18 years of age, 2086, or 33 1-2 to a district. There is an academy at Randolph, and one at Bradford, and there is a flourishing seminary at Newbury under the patronage of the Methodists. Randolph academy is one of the oldest in the state. It was established in 1806.

*Villages.* The principal villages are in Randolph, Chelsea, Newbury, Thetford and Williamstown. The county buildings are in Chelsea.

*History.* The first civilized inhabitants in this coun-

erals?—building material—the soil? Horses? &c.—the pursuits?—rail roads? school districts? Scholars?—academies?—villages? When was the settling

ty, settled at Newbury in 1762. The Indians had formerly resided here in considerable numbers, and the place was called by them Coos. They had made large clearings on the intervalles, which were overgrown with coarse grass, when the whites began their settlement here. Their implements, manufactured out of stone, are often found in the vicinity at the present day.

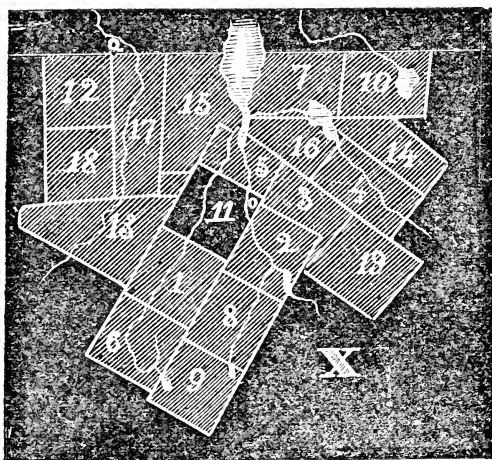
Newbury was the chief place in Vermont on the east side of the mountains to the northward of Westminster, during the revolution, and was garrisoned by one or more companies of soldiers. Gen. Jacob Bailey and Col. Thomas Johnson, were among the first settlers of this county.

## X. ORLEANS COUNTY.

Incorporated, Nov. 5.	- 1792	Number of towns,	- - - 19
First settlement,	- - - 1788	Square miles,	- - - 689
Population in 1840,	- - 13,634	Pop. to the square mile,	- - 20

### TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Ir. List 1847.
1. Albany,	June 26, 1782	1782	1806	926	36	25½	1,457
2. Barton,	Oct. 20, 1789	1798	1798	812	36	24½	2,220
3. Brown ton,	Oct. 2, 1798	1800		426	31	15½	975
4. Coventry,	Nov. 10, 1780	1805	1806	731	36	20½	1,383
5. Charl ton,	Oct. 23, 1784	1800	1803	706	35	22½	1,597
6. Craftsbury,	Aug. 23, 1781	1785	1792	1,151	36	32	2,428
7. Derby,	Oct. 29, 1779	1785	1798	1,681	36	46	3,095
8. Glover,	Nov. 20, 1783	1797		1,119	36	31	2,139
9. Greens'ro,	Aug. 20, 1781	1781	1792	885	36	24½	2,074
10. Holland,	Oct. 26, 1785	1800	1805	605	36	17	787
11. Irasburgh,	Feb. 23, 1781	1798	1803	971	26	27	1,786
12. Jay,	Nov. 7, 1792			308	26	8½	391
13. Lowell,	June 7, 1791	1806	1812	431	61	7	923
14. Morgan,	Nov. 6, 1780	1800	1807	422	31	13½	628
15. Newport,	Oct. 30, 1802			511	26	16½	803
16. Salem,	Aug. 18, 1781	1798	1822	299	27	11	427
17. Troy,	Oct. 13, 1792	1800	1802	876	36	23½	2,117
18. Westfield,	May 15, 1789	1798	1802	370	36	10½	861
19. Westmore,	Aug. 17, 1781			122	36	3¼	255
Covenry Gore	- - -	- - -	- - -	19			
				13,634	689	20	27,621



*Situation.* Orleans county is situated in the north part of the state, midway between lake Champlain and Connecticut river and bordering on Canada.

*Boundaries.* It is bounded on the north by Canada, east by Essex county, south by Caledonia and Lamoille counties, and west by Franklin county.

*Extent.* The length of the county from north to south is about 38 miles, and its width, from east to west, 30 miles, containing 689 square miles. It is divided into 19 townships, and one small gore.

*Shire Town.* Irasburgh.

*Surface.* The surface of this county is uneven, and the western parts mountainous. The most elevated summit is Jay Peak, on the line between Jay and Richford. Derby is the most level township, and there are but few handsomer or better townships in the State. The large swell of land on which Craftsbury common is situated is a beautiful and excellent tract of land; and there are some handsome flats along the rivers in different parts of the county. The following heights above the sea are deduced from the canal surveys made by De Witt Clinton, in 1825:—

How is Orleans Co. situated?—bounded?—extent?—shire town?—the surface?

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Memphremagog lake, (estimated)	600 feet.
Salem pond, Salem, - - -	872 "
Pensioners pond, Charleston,	1045 "
Mill dam, Black river, Irasburgh,	728 "
Elligo pond, Craftsbury, - -	797 "
Craftsbury common, - - -	1153 "
Crystal or Belle pond, Barton,	837 "
Willoughby lake, Westmore,	1065 "

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Mt. Hor and Mt. Pisgah, in Westmore, rise from the margin of Willoughby lake. The highest is probably 1200 feet higher than the lake, or 2250 feet above the sea.

*Streams.* These are very numerous, and for the most part discharge their waters into lake Memphremagog. The western part is watered by Missisco river, which is formed by the union of several streams in Lowell, and runs north through the corner of Westfield, and through Troy into Potton in Canada. The remaining part of the county is watered principally by Black, Barton and Clyde rivers. The streams which issue from the ponds in Holland, pass through Stanstead, and fall into Masuippi lake in Hatley, Canada.

*Falls.* The most interesting water-fall is in Missisco river, in the northern part of Troy.

*Ponds.* Besides lake Memphremagog, about one-third of which lies in this county, the ponds are numerous, and several of them are of considerable size. The most important are Willoughby lake, in Westmore, 6 miles long and 1 1-2 wide; Crystal or Belle pond, in Barton, 3 miles long and 1 1-2 wide; Seymour's lake, in Morgan, 4 miles long and 2 wide; Salem pond, partly in Salem and partly in Derby, and Elligo and Hosmer's ponds, in Craftsbury. There was formerly a pond on the line between Greensborough and Glover, which was 1 1-2 miles long, and was called Long pond, and was the head of Lamoille river. On the 6th of June, 1810, some persons undertook to open a channel at the north end in order to draw off water for the better supply of a mill on Barton river. The bank proved to be a light loose sand, and as soon as the water commenced running in that direction it immediately opened an im-

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highest point?—most level towns?—what swell mentioned?—heights?—what streams? Where is Missisco river formed? How are the different parts watered? What falls? What lakes and ponds? What is said of Runway pond? With



mense channel by which all the waters of the pond were discharged in a few minutes leaving its bed bare. This bed is now known by the name of *Runaway pond*. A small stream runs from it to the north, forming the head branch of Barton river.

Many of the ponds in this county are well stored with trout. Trout (longe) have been taken from a pond, in Charleston, weighing more than 40 lbs.; and, in Glover, weighing 25 lbs.

*Curiosities.* In the northwestern part of Greensborough are several blocks of granite which may be regarded as curiosities. (See page 75.) Willoughby lake and the scenery around it, are also objects of much interest.

*Geology.* All the rocks in the county are primitive excepting the granite. The rocks along the western margin are talcose slate. Next east of this are ranges of steatite and serpentine commencing in the central part of Lowell, and extending north through Westfield and Troy into Canada. To the southward of Lowell the talcose slate is succeeded on the east by clay slate belonging to the calcareo-mica slate formation, which together with the granite occupies all the central and eastern parts of the county, excepting a small portion of the eastern part, where a siliceous slate is found.

The granite appears in interrupted ranges extending nearly in the direction of the strike of the stratified rocks, which is a little to east of north. The most westerly range of granite appears in Craftsbury, Irasburgh, and Derby. Most of the summits in the southern and eastern part of the county are granite, while the lower lands and swells are of the calcareo-mica slate formation. The mountain in Barton, northeast of Crystal pond, Mount Hor and Pisgah, in Westmore, &c., are granite.

*Dikes.* Dikes are met with at several places in this county, but they differ very much in their character, being some of them greenstone, others resembling steatite, others white quartz, &c. The swell of land on which Craftsbury common is situated abounds in dikes. Dikes of all the kinds mentioned above are found here. In the northwestern part of Albany there is a green-

what are the ponds stored?—how large? What curiosities? What is said of the rocks? In the western part?—north east?—the central and eastern part? What is said of the granite? What is said of Dikes? Where do they abound? What

stone dike, 4 feet wide, in clay slate, which disintegrates into round masses about the size of a musket bullet. There are also interesting dikes in Greensborough, Brownington, and Troy.

*Marl.* Shell marl is found at several places in that part of the county occupied by the calcareo-mica slate formation. Beds occur in Albany, Craftsbury, Derby, Holland, Glover, and probably in other towns. Some of these beds properly burned would make tolerably good lime. There is no limestone in the county excepting the blue limestone of the calcareo-mica slate formation, which is too siliceous to make good quicklime.

*Ores.* Iron is the only metallic ore known to exist here in much quantity. This is found in the state of oxide of iron and of chromic iron.

A very large irregular bed or vein of the oxide of iron was discovered several years ago in Troy, in serpentine rock. Iron works have been erected here at considerable expense, and a large amount of iron has been manufactured, but it contains titanitic acid, and is found to be so difficult an ore to work, that it has not hitherto been wrought to any profit to the proprietors.

The analysis of this ore gives,

Peroxide of iron,	.	.	.	.	.	.	.	.	81.20
Protoxide "	.	.	.	.	.	.	.	.	13.37
Titanic acid,	.	.	.	.	.	.	.	.	4.10
Silica,	.	.	.	.	.	.	.	.	1.33

It yields 62 1-2 per cent of metal iron,	.	.	.	.	.	.	.	.	100 00
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The principal veins of chromic ore are found in Westfield and Jay. They are in Serpentine rock; and in Jay some of the veins are two feet wide, and so situated that the ore can be easily obtained from them in any quantity desired.

This ore contains

Green oxide of chromium,	.	.	.	.	.	.	.	.	49.90
Protoxide of iron,	.	.	.	.	.	.	.	.	48 14
Alumina, (and trace of silica and magnesia),	.	.	.	.	.	.	.	.	4.11

This ore has been worth in market almost as much as manufactured iron. It is not used for the manufacture of iron, but of paints, such as chrome yellow and chrome green.

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Is said of marl?—limestone? What ores? Troy ore? Where is chromic iron found?—in what?—of what does the ore consist?—for what used? What is

*Minerals.* No county in the State furnishes a more interesting variety of minerals than this. Along the valley of Missisco river, besides the talcose slate, steatite and serpentine, and the titaniferous and chromic iron already mentioned, there are found fine specimens of precious serpentine, different varieties of amianthus and asbestos, schorl and some other minerals. At Craftsbury east village there is a formation of granite, rendered very singular by containing flattened balls of mica, usually near an inch in diameter, scattered through it like plums in a pudding. It is generally called *nodular granite*. The nodules or balls are made up of concentric laminae of mica, separated by a thin layer of quartz. In Derby are found calcareous tufa and a clay resembling fuller's earth. Plumbago and fine crystals of schorl are found in the eastern part of Glover. Novaculite is found in an island in Memphremagog lake, and extending south to Irasburgh. It makes good hones, and has been manufactured and sold under the name of *Magog Oilstone*.

*Building Materials.* Granite is the most important building stone, and it is found plentifully and of good quality, either in place or in boulders, in all parts of the county excepting, perhaps, a small portion of the north western part. Good clay and sand for bricks are less common in this than in some of the other counties.

*Soil and Productions.* The soil of the county is rich and productive, and there are several very fine farming towns. Derby and Craftsbury are two of the best; the former being surpassed by very few in the state. In 1840, there were in the county:

Horses, - - -	3,462	Rye, - bushels, -	2,400
Cattle, - - -	18,299	Buckwheat, " -	20,067
Sheep, - - -	46,669	Indian corn, " -	20,886
Swine, - - -	9,750	Potatoes, " -	569,855
Wheat, bushels,	33,315	Hay, tons, - -	37,291
Barley, " - -	10,997	Maple sugar, lbs.	507,446
Oats, " - -	133,301	Wool, " -	107,480

*Pursuits.* The pursuits are almost exclusively agricultural. In 1840, 38 were engaged in commerce, 384 in manufactures and trades, and 51 in the learned professions.

\*aid of minerals? What found in the Missisco valley? In Craftsbury? Glover? &c. What is said of novaculite? What is said of building materials? Soil and productions? Horses? &c. villages? How many school districts? - scholars?

*Villages.* The villages are all small. The most important are Irasburgh, Craftsbury, Coventry, Barton and Derby. Irasburgh is the shire town.

*Education.* The county has 161 school districts, 159 of which contain 5143 scholars between 4 and 18 years of age, averaging  $32\frac{1}{2}$  to a district. Besides the district schools, there have been for several years, three good academies, one at Craftsbury, one at Brownington, and one at Derby.

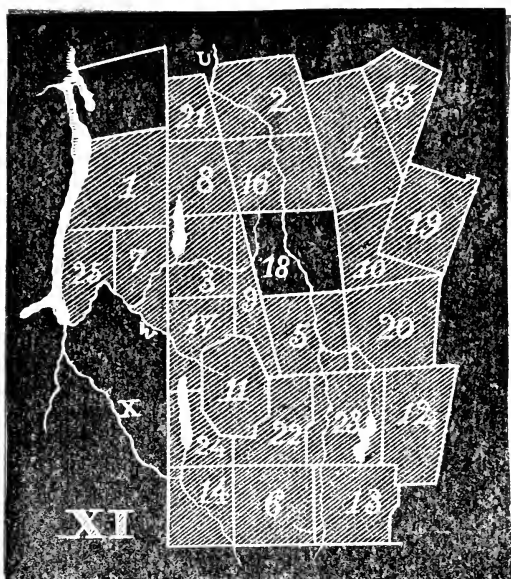
*History.* The first settlement within the present limits of the county, was made in 1788 by Col. Ebenezer Crafts.

## XI. RUTLAND COUNTY.

Incorporated, Feb. - - - 1781	Number of towns, - - - 25
First settlement, - - - 1761	Square miles, - - - 862
Population in 1840, - - 30,699	Pop. to the square mile, • 33

### TOWNS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Gr. List. 1847.
1. Benson,	May 5, 1780	1783	1786	1,403	39	36	\$4,881
2. Brandon,	Oct. 20, 1762	1775	1784	2,194	39	56 $\frac{1}{2}$	7,090
3. Castleton,	Sep. 22, 1761	1770	1777	1,769	39	45 $\frac{1}{2}$	6,119
4. Chittenden,	Mar. 16, 1780			644	48	13 $\frac{1}{2}$	1,586
5. Clarendon,	Sep. 5, 1761	1768	1778	1,549	41	37 $\frac{3}{4}$	5,791
6. Danby,	Aug. 27, 1761	1765	1769	1,379	39	35 $\frac{1}{2}$	4,780
7. Fairhaven,	Oct. 27, 1779	1779	1783	633	27	23 $\frac{1}{2}$	2,055
8. Hubbard'n,	June 15, 1764	1774	1785	719	28	25 $\frac{3}{4}$	2,067
9. Ira,	Nov. 3, 1780		1779	431	22	19 $\frac{1}{2}$	1,468
10. Merdon,	Feb. 23, 1781		1806	545	25	22	1,051
11. Middleton,			1786	1,057	24	44	2,602
12. Mt Holly,	Oct. 31, 1792	1781	1792	1,356	44	31	3,337
13. Mt Tabor,	Aug. 28, 1761			226	39	6	714
14. Pawlet,	Aug. 26, 1761	1761	1769	1,748	39	45	6,655
15. Pittsfield,	July 29, 1781	1786	1793	615	22	28	953
16. Pittsford,	Oct. 12, 1761	1769	1770	1,927	44	46	7,133
17. Poultney,	Sep. 21, 1761	1771		1,878	32	58 $\frac{3}{4}$	6,835
18. Rutland,	Sep. 7, 1761	1770		2,708	42	64 $\frac{1}{2}$	11,544
19. Sherburne,	July 7, 1761	1785	1794	498	42	12	910
20. Shrewsb'y,	Sep. 4, 1763			218	44	27 $\frac{3}{4}$	4,314
21. Sudbury,	Aug. 6, 1761			796	23	34 $\frac{1}{2}$	2,140
22. Tinmouth,	Sep. 15, 1761	1770	1777	780	29	27	2,654
23. Walling'd,	Nov. 27, 1761	1773	1778	1,608	39	41 $\frac{1}{2}$	7,433
24. Wells,	Sep. 15, 1761	1768	1773	740	28	26 $\frac{1}{2}$	1,870
25. W. Haven,	Oct. 27, 1779	1779	1792	774	24	32 $\frac{1}{2}$	2,142
				28,195	682	33	98,124



*Situation.* Rutland county is situated mostly on the west side of the Green mountains, bordering in part on lake Champlain.

*Boundaries.* It is bounded on the north by Addison county, east by Windsor county, south by Bennington county, and west by Washington county, N. Y., and lake Champlain.

*Extent.* The extreme length of this county from north to south, is about 42 miles, and its width 34 miles, with an area of 862 square miles. It is divided into 25 townships.

*Shire Town.* Rutland.

*Surface.* The eastern part of the county is elevated and constitutes a portion of the main range of Green mountains, in which are exhibited several important summits. The Taconic range of mountains and hills,

How situated?—bounded?—extent?—shire town?—the surface?—ranges of moun-

passes from south to north, a little west of the centre, the valley between it and the Green mountains being occupied by Otter creek.

The following are the heights of several points in this county, above lake Champlain.

Shrewsbury Peak, in Shrewsbury, - - -	3996 ft.
Killington Peak, in Sherburne, - - - - -	3834
Railroad summit, Mount Holly - - - - -	1270
Rutland village, - - - - -	400

*Streams.* Otter creek flows through the county from south to north, and is the principal stream. Gookin's falls, in this stream, near the centre of Rutland, and Southerland's falls, near the north line of that township, furnish a large amount of available water power. The western part of the county is well watered, by Hubbardton, Castleton, Pawlet and Poultney river.

Black, White and Otta Quechee rivers, all originate in the eastern part of the county and flow into Connecticut river.

Several of the branches of Otter creek, in this county, are important mill streams, among which, are Mill river, in Brandon, and Furnace brook, and East creek, in Rutland.

*Springs.* The springs in Clarendon, have acquired some celebrity, for their medicinal properties, and are places of considerable resort during the summer. They are situated in the western part of Clarendon, near Furnace brook. They contain small quantities of the carbonate and muriate of lime, and sulphate of soda, and abound in gases, particularly nitrogen, which is constantly escaping from the water, in large bubbles. They also contain a considerable amount of carbonic acid gas.

*Ponds.* Ponds are numerous; the most important of which are Wells' pond, in Wells, lake Hiram in Wallingford, and lake Bombazine in Castleton. Wells' pond is 5 miles long, and in places, 2 miles wide, covering over 2000 acres. Lake Hiram, from its shape, is also called *Spectacles pond*. Lake Bombazine, is 8 miles long and its greatest width is 2 1-2 miles. There is an

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rains?—height?—Otter creek?—falls?—What other streams?—springs?—what do they contain? What ponds? Describe Wells pond?—lake Hiram?—Bombazine?

island in this lake containing about 10 acres, which is a favorite place of resort.

*Geology.* The rocks of the central part of Rutland county, all belong to the Taconic group; having the Green Mountain gneiss on the east, and rocks of the Champlain group on the west. The most easterly towns, particularly Sherburne and Pittsfield, are principally of the talcose slate formation.

The quartz rock of the Taconic system extends north through the towns of Mount Tabor, Wallingford, Shrewsbury, Mendon and Chittenden. To the westward of this, occupying the valley of Otter creek, lies the Stockbridge limestone, extending entirely through the county. This limestone furnishes marble of excellent quality, and in the greatest abundance.

Quarries have been opened and extensively wrought, particularly in Rutland, Pittsford and Brandon. Some of the marble in Rutland, and Brandon is suitable for statuary.

The green Taconic slate, in Hubbardton is suitable for slate pencils, which are extensively manufactured from it in Rutland. In Fairhaven there is slate suitable for writing slates, and for roofing, and also for the manufacture of slate pencils. Writing slates have been manufactured from it to a considerable extent.

*Fossils.* About the first of October, 1848, a fossil tooth weighing about 8 pounds, and supposed to be the tooth of an elephant, was found in Mount Holly, several feet below the surface of the ground, in making excavations for the railroad. A few days afterwards a horn, or tusk, was found near the same place, which measured about 4 feet in length. If these are remains of a fossil elephant, they are the first ever found in Vermont, and only a very few have been found to the eastward of the Hudson.

*Marl.* There is a bed of marl in Benson, near the meeting house, covered with muck.

*Ores.* Brown iron ore is found in Tinmouth, Wallingford, Rutland, Pittsford, Chittenden and Brandon. The most important ore beds have been opened in the three towns last mentioned, where the ore is extensively manufactured into iron. In connexion with this

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What are the rocks in the central part?—western?—eastern?—the quartz? Stockbridge limestone?—quarries?—Taconic slate?—of fossils?—marl?—iron ore?—

iron ore, are found large quantities of black oxide of manganese. From Chittenden a large amount of manganese has been sent to market.

*Minerals.* Brown iron ore, oxide of manganese and lead ore have been already mentioned. Besides these sulphate of iron abounds in Shrewsbury, and has been much worked for copperas. Asbestos is found in Mount Holly, feted and smoky quartz in Shrewsbury, and calcareous tufa, in Clarendon.

*Building Materials.* The quarts rock in the northeastern part of the county in many places, furnishes an excellent building stone. It was used in constructing the jail in Addison county. It is raised in plates so large that a single stone is sufficiently large to form the side of a cell.

*Soil and Productions.* Along Otter creek and in much of the western part, the land is tolerably level and the soil rich and productive. In other parts the surface is broken, but the lands produce good grass and grain. The following are the statistics of 1840.

Horses,	-	-	6200	Rye,	"	-	-	38,013
Cattle,	-	-	40,023	Buckwheat, bush.				10,850
Sheep,	-	-	271,727	Indian Corn, "	-			154,792
Swine.	-	-	15,563	Potatoes,	"			642,108
Wheat, bush.	-	-	40,116	Hay, tons,	-			103,737
Barley, "	-	-	853	Maple sugar, lbs.				396,804
Oats, "	-	-	154,119	Wool,	"			653,819

*Pursuits.* In 1840, 5595 persons were engaged in agriculture, 129 in commerce, 1155 in manufactures and trades and 164 in the learned professions.

*Villages.* The most important villages are Rutland, Castleton and Brandon. Rutland contains the county buildings, and several churches.

*Education.* The number of school districts is 275. In 240 of these are 8834 scholars between 4 and 18 years of age, averaging about 37 to a district. The higher institutions are the Castleton Medical College, the Troy Conference Academy at Poultney, and the Brandon Seminary.

*History.* The first settlement within this county was made in Pawlet in 1761, the same year in which the settlement of Bennington was commenced. Before

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manganese?—lead ore?—what minerals? What building stone? What is said of the soil? How many horses? &c. How many school districts?—scholars?—average to a school? What hi institutions? When and where was the first



the revolution, settlements were begun in nearly one half of the towns in the county.

During the war several small forts were erected in the county. Two of these situated in Pittsford, and called fort Motte and fort Vengeance were the most northerly forts held by the Americans during the revolution. In Hubbardton in this county, a battle was fought on the 7th of July, 1777. When Rutland county was incorporated in 1781, it embraced all the territory on the west side of the mountains to the northward of Bennington county.

## XII. WASHINGTON COUNTY.

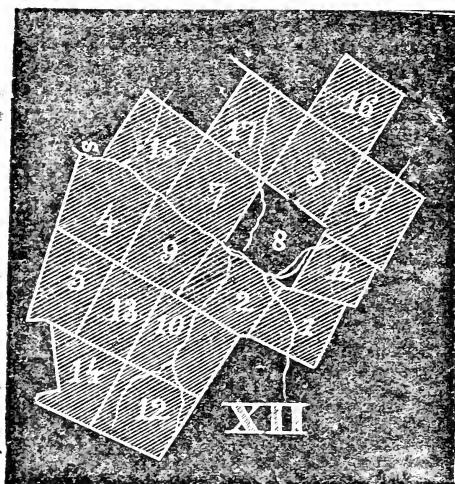
Incorporated Nov. 1, - 1810	Number of towns, - - -	17
First settlement, - - - 1783	Square miles, - - -	571
Population in 1840, - 23,506	Pop. to the square mile,	41

### TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized	Pop. in 1840.	Sq. miles	Pop. to sq. mile	Gr. Lit. 1837.
1. Barre,	Nov. 6, 1780	1788	1793	2,126	34	62½	86,092
2. Berlin	June 8, 1763	1785	1791	1,598	34	47	3,969
3. Calais,	Aug. 15, 1781	1787	1795	1,709	36	47½	3,546
4. Duxbury,	June 7, 1763	1786		820	36	23	1,576
5. Fayston,	Feb. 27, 1782	1798		635	34	18½	817
6. Marshfield,	June 22, 1790	1794	1800	1,156	36	32	2,422
7. Middlesex,	June 8, 1763	1783	1788	1,270	36	35½	3,102
8. Montpelier,	Aug. 14, 1781	1787	1791	3,725	36	103½	11,359
9. Moretown,	June 7, 1763	1790	1794	1,128	36	31½	2,071
10. Northfield,	Aug. 10, 1781	1785	1794	2,013	39	51½	4,610
11. Plainfield,	Oct. 27, 1788	1794	1796	882	16	55	1,926
12. Roxbury,	Aug. 6, 1781	1789	1796	784	36	22	1,485
13. Waitsfield,	Feb. 25, 1782	1789	1794	1,048	28	37½	2,539
14. Warren,	Oct. 20, 1789	1797		943	26	36½	1,603
15. Waterbury,	June 7, 1763	1784	1790	1,992	36	55½	5,060
16. Woodbury,	Aug. 16, 1781			1,092	36	30½	1,193
17. Worcester,	June 8, 1763	1797	1803	587	36	16½	1,052
				23,506	571	41	54,423

settlement? What said of forts? What battle? What do you know about it? What the original extent of the co.?

When was Washington co. incorporated?—settled?—population?—towns?—square miles?—pop. to a square mile?—what town first settled?—most populous?



S. Winooski River.

*Situation.* Washington county lies nearly in the centre of the state, and mostly between the main range of the Green Mountains on the west, and that range of these which strikes off to the northeast, called the height of lands.

*Boundaries.* It is bounded north by Lamoille and Caledonia counties, east by Caledonia county, south-east by Orange county, south by Addison county and west by Chittenden county.

*Extent.* This county extends from north to south about 34 miles, and from east to west 34 miles, containing 571 square miles. It is divided into 17 townships.

*Shire town.* Montpelier.

*Surface.* The surface is very uneven, and in parts mountainous. The Green Mountains extending along the western part present in Duxbury, on the line between this county and Chittenden county, one of their loftiest summits, which is Camel's Hump, elevated 4083

most wealthy? &c. How is Washington co. situated?—bounded?—extent?—shire town? what is said of the surface? What heights are given? What

above the sea. A ridge called the Hog Back, extends north and south between Waterbury and Middlesex. The following are the heights above the sea of some points in this county which have been ascertained by measurement.

Camel's Hump, Duxbury, - - - -	4083 feet.
Rail Road Summit, Roxbury, - - - -	997 "
Rail Road Depot, Northfield, - - - -	724 "
State House, Montpelier, - - - -	540 "
Mouth of Dog River, Berlin, - - - -	492 "
Middlesex Village, (R. R. Grade,) - - - -	520 "
Waterbury Village, (R. R. Grade,) - - - -	418 "

*Streams.* This county is watered wholly by Winooski river, which runs through it in a general westerly direction; and by its numerous branches. The principal branches, which enter the Winooski on the north side, are Waterbury river, Little North Branch at Montpelier village, and Kingsbury Branch in the eastern part of Montpelier. Those entering on the southside are Mad river in Moretown and Dog river and Stevens Branch in Berlin. These furnish abundance of water power in all parts of the county.

*Falls.* The most interesting falls in the county are in Marshfield, in one of the main head branches of Winooski river, and called the *Great Falls*. The fall is 203 feet in about 20 rods. There is a fine view of these falls from the stage road leading from Montpelier to Danville. The head of the falls is 1059 feet above the sea. The falls at Middlesex and Montpelier, are among the most valuable for their available water power.

*Ponds.* There are several natural ponds in Woodbury and Calais, but they are mostly small. There is also a beautiful pond in Berlin.

*Curiosities.* A chasma worn in the rocks by Winooski river at Middlesex village, and another in the lower part of Waterbury, called the Natural Bridge are considerable curiosities.

*Geology.* The rocks in this county are all primary, excepting the granite, which abounds in the towns of Marshfield, Plainfield and Barre, particularly the latter. Along the western part of the county, the rocks are talcose and mica slate. Then comes a range of stea-

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river waters the county? What its boundaries? What falls? The height of the great fall? What ponds?—curiosities? What are the rocks? Where are

tite associated with serpentine. This appears more or less in the towns of Waterbury, Moretown, Waitsfield, Warren and Roxbury. To the eastward of this, the rocks are talcose and chlorite slate, to a line along the valley of Dog river, through the village of Montpelier and through the eastern part of Calais and Woodbury. This line divides the talcose slate region from that of the calcareo-mica slate which lies to the eastward of it. The change from one of these formations to the other may be seen at the village of Montpelier by comparing the rocks near the state house with those near the bridge on the Berlin side of the river, and on the east side of the road leading to Northfield.

There is no limestone known to exist in the county to the westward of the line above mentioned, excepting a small bed of white saccharoid limestone in Moretown. But to the eastward of this line many of the strata are calcareous, but they are all too siliceous to make good lime for architectural purposes.

The rocks in the western part of the county have a steep eastern dip. A little to the eastward of the steatite range they are vertical, forming a synclinal axis. This may be seen from the stage road in the eastern part of Waterbury, is the principal, forming the bank of the river. All the stratified rocks to the eastward of the axis have a steep westerly dip. At Montpelier village the dip is about  $70^{\circ}$  west. The general strike of the rocks is from about  $22^{\circ}$  west of south to  $22^{\circ}$  east of north.

The rocks in the eastern part of the county are, to a great extent, granite, particularly in the eastern parts of Barre, Plainfield and Marshfield. The granite quarries in Barre, furnished the stone of which the state house was built. The granite in this county is evidently more recent than the calcareo-mica slate formation, since it frequently contains fragments of slate embedded in it. The granite, though very irregular, for the most part extends in ranges in the direction of the strike of the stratified rocks.

*Dikes.* Very few dikes have been observed in this county. In the rocks which form the Great falls in Marshfield, there is a greenstone dip, which is 52 inches

steatite and serpentine? Where the line between the talcose and calcareo-mica slate formation? What is said of limestone?—of dip?—synclinal axis?—strike? rocks in the eastern part? What is said of the granite?—dikes?—marl?—ores?—

wide running in the direction of the strike of the rocks which is there about  $60^{\circ}$  east of north.

*Marl.* Beds of shell marl have been opened in Calais and Woodbury. They are found here, as elsewhere on the east side of the Green Mountains, only on the calcareo-mica slate formation.

*Ores.* There is a large bed of sulphuret of iron in Woodbury, suitable for the manufacture of copperas. Specimens of arsenical iron, are found in Waterbury, and also sulphuret of iron, and sulphuret of copper. The latter is found in the northeast part of the town in the seams between strata of talcose slate which are there nearly vertical, dipping east  $85^{\circ}$ . A considerable excavation has been made, here and several tons of the ore raised, but the process was found to be too expensive to warrant its continuance. The common varieties of iron ore have been found in small quantities at several places.

*Minerals.* Large and beautiful specimens of rock crystal are found in Middlesex and Waterbury. There is also in the north west part of Waterbury, a locality of beautiful claystones.

*Building Materials.* The granite in Barre, and in many other places, where granite occurs in the county, furnishes the very best material for building. Blocks of it can be obtained of any size or form that may be required. The clay slate in the calcareo-mica slate formation in Berlin, at some localities, is found to answer tolerably well for roofing slate. Clay and sand suitable for bricks, are found in various places, but there is no limestone suitable for the manufacture of quicklime in the county. The steatite in Moretown, and serpentine in Roxbury, furnish materials valuable for many purposes.

*Soil and Produce.* The soil generally is rich and productive.

Horses,	-	-	-	4,360	Burley,	bush.	4,028
Cattle,	-	-	-	25,415	Oats,	"	200,294
Sheep,	-	-	-	110,892	Rye,	"	5,713
Swine,	-	-	-	12,150	Buckwheat,	"	23,066
Wheat,	bush.	-	-	44,110	Indian Corn,	"	63,103
Potatoes,	"	-	-	697,785	Hay,	tons,	55,100
Maple Sugar,	lbs.	-	-	451,348	Wool,	lbs.	159,724

minerals?—of building materials?—soil? How many horses? &c.—of the pur-

*Pursuits.* The people are generally employed in agriculture. In 1840, 136 were engaged in commerce, 1403 in manufactures and trades and 105 in the learned professions.

*Education.* The county contains 215 school districts, in 147 of which there are 5678 scholars between 4 and 18 years of age, averaging 38½ to a district. There is a flourishing academy in Montpelier.

*Villages.* Montpelier is the capital of the state, and the shire town of the county. Montpelier village is one of the largest and wealthiest villages in Vermont. Its principal public buildings are the state house, a court house, (probably the best in the state,) two congregational meeting houses, an episcopal church and a methodist chapel. The other villages of most importance are Waterbury, Middlesex, Barre and Northfield.

*History.* This county was incorporated out of territory previously embraced in other counties, November 1, 1810, by the name of Jefferson county, and was organized December 1, 1811. The name was altered to Washington county November 8, 1814.

The first settlement within the present limits of the county, was made at Middlesex, in 1783, by Mr. Thomas Mead.

### XIII. WINDHAM COUNTY.

*Situation.* Windham county lies in the south east corner of the state bordering on Massachusetts and Connecticut river,

*Boundaries.* It is bounded on the north by Windsor county on the east by Connecticut river, on the south by Massachusetts, and on the west by Bennington county.

*Extent.* It is 36 miles long from north to south, and 28 miles wide from east to west containing 782 square miles. It is divided into 23 townships.

*Shire Town.* Newfane.

*Surface.* The surface of this county is uneven and

suits? How many school?—scholars in 147 districts? What is said of Montpelier?—other villages? Out of what was the co. formed?—when?—by what name? When was the name altered? When and where the settlement commenced? How is Windham co. situated?—bounded?—extent?—shire town?—what is said of the surface?

## XIII. WINDHAM COUNTY.

Incorporated, Feb. 11, - 1779	Number of towns, - - - 23
First settlement, - - - 1724	Square miles, - - - - 782
Population in 1840, - - 27,442	Pop. to the square mile, - - 35

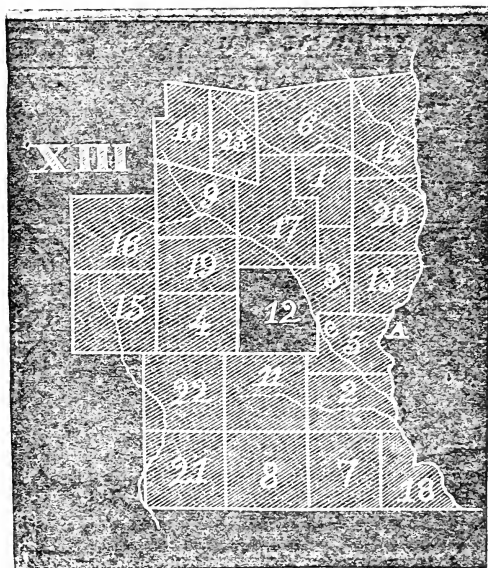
## TOWNS.

Towns.	Chartered.	Settled.	Organized.	Pop. in 1840.	Sq. miles.	Pop. to sq. mile.	Gr. List 1847.
1. Athens,	May 3, 1780	1780	1781	378	15	25	\$1,042
2. Brattleb'h,	Dec. 26, 1750	1724		2,624	34	77	10,565
3. Brookline,	Oct. 30, 1794	1777	1795	328	11	30	838
4. Dover,	Nov. 7, 1780			729	29	25	2,121
5. Dumm'n,	Dec. 26, 1753			1,263	30	42	2,994
6. Grafton,	Apr. 6, 1754	1780		1,326	38	35	3,201
7. Guilford,	Apr. 2, 1754	1761		1,525	39	39	4,824
8. Halifax,	May 11, 1750	1761	1770	1,399	39	36	2,654
9. Jamaica,	Nov. 7, 1780	1780	1781	1,586	49	32 $\frac{1}{2}$	3,146
10. London'y,	Apr. 20, 1780	1774		1,216	24	50 $\frac{2}{3}$	2,164
11. Marlbo'h,	Sep. 21, 1761	1763	1775	1,027	30	26 $\frac{1}{3}$	2,744
12. Newfane,	Nov. 3, 1761	1766	1774	1,403	38	37	4,528
13. Putney,	Dec. 26, 1753	1744	1770	1,383	31	45 $\frac{1}{2}$	4,475
14. Rock'gm,	Dec. 28, 1752	1753	1760	2,330	42	55 $\frac{1}{3}$	8,051
15. Somerset,				262	39	7	768
16. Stratton,				341	42	8 $\frac{1}{2}$	605
17. Townsh'd,	June 20, 1753	1761	1771	1,515	47	32	4,395
18. Vernon,	Sep. 5, 1753			705	21	33	2,590
19. Wards'bo,	Nov. 7, 1780	80	1786	1,102	29	38	2,790
20. Westmin'r,	Nov. 9, 1752	1741		1,556	44	35 $\frac{1}{4}$	5,461
21. Whiting'm,		1770	1780	1,391	39	36	3,126
22. Wilm'ton,	Apr. 25, 1751			1,296	39	33 $\frac{1}{4}$	4,074
23. Windham,				757	24	31 $\frac{1}{4}$	1,878
				27,442	782	35	79,034

the greater part of it is hilly or mountainous. The highest summit in the county is Manicknung mountain in Stratton.

*Streams.* West river is the principal stream and waters more than half the county. The south western parts are watered by Deerfield river, and the north eastern parts by William's and Saxton's rivers. Green river rises in Malborough, crosses the corner of Halifax, and runs through the western part of Guilford,

When was Windham co. incorporated?—settled?—population?—towns?—square miles?—persons to a square mile?—what town first settled?—first organized?—most populous?—most wealthy?—How is Orange co. situated?—bounded?



into Massachusetts. West river, though a considerable stream, furnishes very few good sites for mills. There are, however, many good mill privileges on its branches, and on the other streams in the county.

*Falls.* Bellows Fall are in Connecticut river, and belong to New Hampshire, but the available water power is on the Vermont side, and therefore, may be regarded as belonging to this county. The amount of fall in the river here is about 42 feet. The first bridge over the Connecticut, was built here in 1785, by Col. Enoch Hale.

*Ponds.* There are several small ponds in this county but none of them large. There are two in Marlborough called Allen's pond and south pond, each of which is  $1\frac{1}{2}$  mile long and three-fourths of a mile wide. *Sawdawda* pond in Whitingham is so called from an Indian

West river?—other rivers?—what falls?—ponds?—of Sawdawda? What



of that name who formerly lived near it. This pond is gradually decreasing by the formation of land over the water, which is said to rise and fall with the water of the pond to the extent of 70 or 80 acres.

*Springs.* There are several mineral springs in this county. One in Guilford, and another in Whitingham, have been places of resort for invalids.

*Geology.* The rocks of the western part of the county are Green Mountain gneiss, with some patches of gneiss proper. Next east of this is a narrow range of talcose slate and steatite, extending from north to south through the county, passing through the eastern part of the towns of Windham, Jamaica, Wardsborough, and Dover, and the western part of Newfane, Marlborough and Halifax. Connected with this on the borders of Newfane, Dover and Marlborough, is an extensive bed of serpentine. The remaining part of the county to the east belongs mostly to the calcareo-mica slate formation, embracing some considerable patches of granite, gneiss, hornblende, and argillaceous slate. There is a range of argillaceous slate in the eastern part of Dummerston, Brattleborough and Guilford, which has been opened in several places, at which it has been quarried for many years for gravestones and roofing slate. It is of good quality, and, now that the rail roads have furnished the means of transportation, there will doubtless be a great increase in the amount prepared for market.

*Marl.* Beds of marl are found in Dummerston, Westminster, and probably in other towns, but they are less common, and less extensive than they are in the calcareo-mica slate formation farther north.

*Ores.* Ores of iron, copper, and lead have been found in the county, but only in very small quantities, and a few particles of gold were obtained a few years ago from the soil in Somerset.

*Minerals.* The variety of minerals found in this county, is very considerable, among which may be mentioned the following. Actynolite is found in Windham, Grafton, Newfane, and some other towns. Bitter Spar is found in Grafton, chalcedony in Newfane; Kyanite at Grafton and Bellows Falls, fluete of lime at Putney

springs?—rock in the western part?—next east?—remaing part?—argillaceous slate?—What is said of it?—of marl?—what ores?—what minerals?—building

and Rockingham, marle prehnite, prinite and tremolite at Bellows Falls, scapolite and schorl in Brattleborough, talc in Grafton, Windham and Newfane, and steatite in Rockingham and Vernon.

*Building Materials.* Granite or gneiss suitable for building stone is found, either in boulders or in ledges, in various parts of the county. The range of steatite through the central part of the county, furnishes in several places a good material for fireplaces, ovens, hearths, aqueducts, &c. Clay and sand suitable for bricks are found in various places. In Brookline there is a bed of pipe clay.

*Soil and productions.* The soil of the county generally may be regarded as of a medium quality. The meadows along Connecticut river are not surpassed, perhaps, in fertility by any lands in the state. Much of the upland too is very productive, while some portions are comparatively hard, gravelly and barren. The productions in 1840 were as follows:

Horses, - -	4,969	Rye, - bushels,	23,502
Cattle, - -	42,661	Buckwheat, " -	13,387
Sheep, - -	114,336	Indian corn, " -	139,924
Swine, - -	29,435	Potatoes, " -	743,366
Hay, tons - -	70,398	Wheat, " -	23,796
Maple Sugar, lbs.	423,400	Barley, " - -	8,120
Wool, " -	222,260	Oats, " - -	178,761

*Pursuits.* The census of 1840 shows that 10,201 persons were engaged in agriculture, 122 in commerce, 1850 in manufactures and trades, and 178 in the learned professions.

*Education.* The number of school districts is 250, in 222 of which there are 7612 scholars between 4 and 18 years of age, averaging a little more than 34 to a district. Several schools of a higher order have been established in the county, one of which is the Leland Classical School at Townshend.

*Villages.* The principal villages are Brattleborough, Bellows Falls in Rockingham and Newfane. Newfane is the shire town. The Asylum for the Insane, one of the most important institutions in the county, is located at Brattleborough.

*History.* The first civilized establishment in the state

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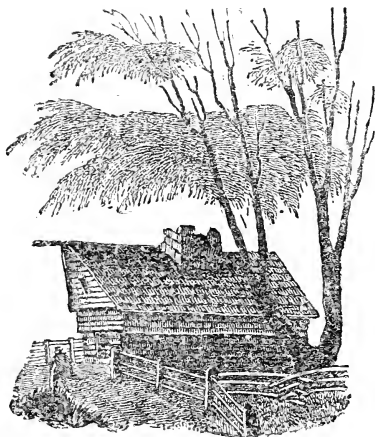
materials?—soil?—productions?—pursuits?—school districts?—scholars?—what villages?—when and where was the first civilized establishment in Vt.?—by

was Fort Dummer, in this county. It was built by the province of Massachusetts in 1724. Shortly afterwards other forts were built in Hinsdale, (now Vernon) and Putney.

These forts were merely blockhouses made of logs with portholes for muskets. One of these was still standing in Vernon, so lately as 1843, and as it is said to be the one in which Mrs. Howe, Crout & Gaffield and their families were taken prisoners by the Indians on the 27th of July, 1755, and carried into captivity, we have inserted below a drawing of it as it appeared in 1840.

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whom?—what was their forte?—What historical event is mentioned?



## XIV. WINDSOR COUNTY.

Incorporated, Feb.	- - 1781	Number of towns,	- - 23
First settlement,	- - 1763	Square miles,	- 893
Population in 1840,	- 40,356	Pop. to the square mile,	45½

## TOWNS.

Towns.	Chartered.	Set- tled.	Orga- nized.	Pop. in 1840.	S. p. miles.	Pop. to sq. mile.	Gr. List. 1847.
1. Andover,	Oct 13, 1761	1776	1781	877	3½	27	\$1,913
2. Baltimore,	Oct 19, 1793		1794	155	½	31	483
3. Barnard,	July 17, 1771	1775	1778	1,774	46	38½	3,809
4. Bethel,	Dec. 23, 1779	1779	1782	1,880	40	47½	4,638
5. Bridgewater,	July 10, 1761	1779	1785	1,367	51	26½	2,859
6. Cavendish,	Oct. 12, 1761	1769		1,427	38	37½	6,041
7. Chester,	Feb. 22, 1754	1764	1767	2,307	41	56½	7,486
8. Hartford,	July 4, 1761	1764	1768	2,194	46	47½	6,561
9. Hartland,	July 10, 1761	1763	1767	2,341	44	53½	7,750
10. Ludlow,	Sep. 16, 1761	1765	1792	1,264	30	45½	3,960
11. Norwich,	July 4, 1761	1762	1766	2,217	46	48½	5,136
12. Plymouth,	July 6, 1761	1777	1787	1,417	44	32½	3,151
13. Pomfret,	July 8, 1761	1770	1773	1,774	41	43½	4,211
14. Reading,	July 6, 1781	1772	1780	1,362	3½	35½	3,890
15. Rochester,	Nov. 6, 1780			1,396	3½	35½	3,181
16. Royalton,	Dec. 20, 1781	1771		1,917	36	53½	5,204
17. Sharon,	Aug. 17, 1761	1765	1768	1,371	40	34½	3,175
18. Springfield,	Aug. 20, 1761			2,625	45	58½	8,404
19. Stockb'ie,	July 21, 1761	1784	1792	1,418	48	29½	2,795
20. Weatherfield,	Aug. 20, 1761		1778	2,081	38	54½	6,708
21. Weston,		1790		1,032	22	47	2,394
22. Windsor,	July 6, 1761	1764	1773	2,744	36	76½	8,804
23. Woodstock,	July 10, 1761	1768	1803	3,315	45	73½	9,968
				40,356	892	45½	112,521

*Situation.* Windsor county is situated on the east side of the Green mountains in the South half of the State, and borders upon Connecticut river.

*Boundaries.* It is bounded on the north by Orange county, east by the west bank of Connecticut river, which divides it from New Hampshire, south by Windham county, and west by Rutland county.

*Extent.* The extreme length of this county from north to south is about 48 miles, and its width from east to

When was Windsor county incorporated?—settled?—population?—towns—sq. miles?—population to sq. mile?—first town settled?—most populous?—most wealthy? &c. How is Windham county situated?—bounded?—extent?



west 30 miles; and it contains 893 square miles. It is divided into 23 townships.

*Shire Town.* Woodstock.

*Surface.* Excepting a few small but fine tracts of intervale along the rivers, the whole surface of the county is uneven. The range of Green mountains stretches along the western part, but the most elevated summits of this portion of the range are in Rutland county. The most important isolated mountain in the county is Ascutney, which lies on the line between Windsor and Weathersfield, and is 3320 feet above the

Shire town? What is said of the surface?

level of the sea. The following heights above the level of the sea have been obtained by measurement:—

Ascutney mountain, - - -	3320 feet.
Rail Road Grade, Bethel Village, -	556 "
Mouth of White River, Hartford, -	306 "
" Otta Quechee, Hartland, -	306 "
Connecticut River, Windsor Village,	288 "

*Streams.* The principal streams are White river in the northern part, Otta Quechee river in the central part, and Black river in the southern part. These all run into the Connecticut which washes the eastern border. Some of the head branches of West river and Williams river rise in the south western part. These several streams furnish sufficient water power in all parts of the county.

*Ponds.* Natural ponds are not numerous in this county. Barnard pond and two or three ponds in Plymouth are the only ones worthy of notice.

*Curiosities.* The falls in Black river at Springfield and Cavendish are, perhaps, as great curiosities of the kind as any in the State. The former are 4 1-2 mile from the junction of Black river with the Connecticut. The amount of fall is 110 feet in 40 rods, 50 of which is nearly perpendicular. The channel in some places is not more than three yards wide; and for 20 rods the river passes through a deep ravine from three to five yards wide, walled by perpendicular ledges from 60 to 80 feet high.

In Cavendish the river has worn down a chasm 100 feet deep. Numerous potholes have been worn in the rocks here, of almost every form and dimension.

In the limestone rock in Plymouth are some interesting caves. The largest consists of seven distinct apartments, and extends in one direction 100 feet. The rooms are of various sizes, some of them being 20 feet wide and 15 high. These caves are about 50 rods from Black river, and were explored by the author of this book in July, 1813.

*Geology.* The principal rock formations in this county are talcose slate, and the calcareo-mica slate formation. The towns of Rochester and Stockbridge, and

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What heights given?—the principal streams?—what ponds?—what curiosities?—in Springfield?—Cavendish?—Plymouth?—what are the rock forma-

the greater part of the towns of Bethel, Barnard, Bridgewater, Plymouth, Ludlow and Andover, belong to the former, while all to the eastward is embraced in the latter. The rocks in Weston and the western part of Ludlow are Green mountain gneiss. Gneiss proper occupies several small sections in the calcareo-mica slate regions, the most considerable of which are Ascutney mountain, and Hawks mountain, between Baltimore and Cavendish. It occurs also in Hartford and Hartland.

In the talcose slate formation there is a narrow range of steatite which appears in Plymouth, Bridgewater, Bethel, and Rochester, and has been wrought at several places.

The rocks in the south part of Bridgewater, and in a large part of Plymouth, and a part of Ludlow, are a light gray limestone. This is the only limestone in the county which makes good lime; and about 2000 hogsheads of it are manufactured annually and transported to different parts of the county. Portions of this limestone are suitable to be worked for marble, some of it being white and some a variegated breccia.

Adjacent to this limestone, and occupying the eastern part of Ludlow and western part of Cavendish, is a large developement of serpentine rock, portions of which furnish that beautiful variety of marble, known by the name of *Verd Antique*. It is used for centre tables, fire places, and ornamental purposes, receiving a high polish, and being very little affected by the strongest acids.

*Marl.* Shell marl exists in Barnard, Royalton and Woodstock, and probably in other towns. From the bed in Barnard considerable quantities of lime have been manufactured. The bed in Woodstock occupies about a dozen acres, and is probably six or eight feet deep.

*Ores.* Iron ore is found in several places, and is the only metallic ore found in the county in sufficient amount to warrant working. The only deposits of iron ore, which have been worked, are in Plymouth, and the ore is of several different varieties. A furnace was erected here, by Mr. Tyson in 1837, and has been kept in suc-

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tion?—what towns belong to the talcose formation?—what is said of gneiss?—steatite?—what limestone is mentioned?—what is said of serpentine?—of shell marl?—iron ore?—Tyson's furnace?—minerals?—name the principal?—what

cessful operation. The principal bed from which the furnace is supplied, is about one fourth of a mile west of the furnace, and is the variety called brown oxide, or brown hematite. This bed lies some distance below the surface of the ground, and appears to be inexhaustible.

*Minerals.* The variety of interesting minerals in this county, is very considerable. In the range of steatite are found beautiful specimens of talc at Bethel and Bridgewater, and at the latter place fine crystals of bitter spar occur; and at the former, elegant crystals of actynolite. Actynolite is also found in Norwich, and also kyanite. Fine large crystals of schorl are found in Bridgewater, in white quartz. Manganese is found at Plymouth in connexion with the iron ore and stalactites were abundant in the Plymouth caves when first discovered.

*Building Materials.* The steatite in Bethel, Bridgewater and Plymouth; and the limestone in Plymouth, and serpentine in Ludlow and Cavendish, are valuable for many architectural purposes; but the most valuable building stone is the gneiss or granite, in the eastern part of the county. The state prison at Windsor, and the jail at Woodstock, are built of this material. Good clay and sand for bricks are common in various parts of the county, and the limestone in Plymouth furnishes a plenty of very good lime.

*Pursuits.* The census of 1840 shows that 11,219 were then engaged in agriculture, 201 in commerce, 2346 in manufactures and trades, and 297 in the learned professions.

*Soil and Productions.* The surface of the county is very uneven; but the soil is good, and produces fine crops of corn, grain and grass. The statistics of 1840 are as follows:

Horses,	-	-	8,440	Rye,	bush.	-	46,126
Cattle,	-	-	51,863	Buckwheat,	"	-	49,330
Sheep,	-	-	234,826	Indian Corn,	"	-	168,897
Swine,	-	-	22,834	Potatoes,	"	-	1,072,753
Wheat, bush.	-	-	56,659	Hay, tons,	-	-	107,109
Barley, "	-	-	5,164	Maple sugar, lbs.	-	-	462,444
Oats, "	-	-	331,026	Wool,	"	-	552,770

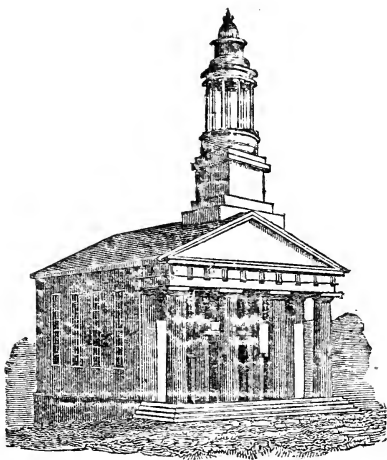
*Villages.* There are almost as many pleasant villages in this county as there are towns. Among the most

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is said of building materia's ?—pursuits ?—productions ?—dillages ?—How many



important are Woodstock, Windsor, Norwich, Royalton, Springfield and Ludlow. Woodstock, is the Shire town and besides the court house and jail, the village contains 4 churches. The Vermont State Prison is located at Windsor, and Norwich University at Norwich.



*Woodstock Court House.*

*Education.* The number of school districts is 313, in 251 of which there are 8036 scholars between the ages of 4 and 18 years, averaging about 31 1-2 to a district. Besides these, there are in the county, Norwich University, the Vermont Medical College, and several academies.

*History.* The first settlements were made in this county in 1763, at Hartland and Norwich. At the commencement of the revolution, settlements had been made in the county all along Connecticut river, and at several places on Ottaquechee and White river. In 1780, the settlement on White river, in Royalton, was visited by a party of Indians, who killed several persons, burnt the buildings, destroyed the cattle, and carried off 25 prisoners into captivity.

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school districts?—scholars in 251 of them?—what higher institutions?—when was the co. settled?—where?—Give an account of the burning of Royalton?

# GOVERNORS OF VERMONT.

Thomas Chittenden,	1778—1788 & 1790—1796,	18 years.
Moses Robinson,	1789 - - - -	1
Isaac Tichenor,	1797—1806, & 1808,	11 "
Israel Smith,	1807 - - - -	1 "
Jonas Galusha,	1809—1812 & 1815—1819	9 "
Martin Chittenden,	1813, 1814, - - -	2 "
Richard Skinner,	1820—1822 - - -	3 "
C. P. Van Ness,	1823—1825 - - -	3 "
Ezra Butler,	1826, 1827, - - -	2 "
Sam'l. C. Crafts	1828—1830 - - -	3 "
Wm. A. Palmer,	1831—1834 - - -	4 "
No choice,	1835 - - - -	1 "
Silas H. Jenison,	1836—1840 - - -	5 "
Charles Paine	1841, 1842, - - -	2 "
John Mattocks,	1843, - - - -	1 "
Wm. Slade,	1844, 1845 - - -	2 "
Horace Eaton,	1846, 1847, - - -	2 "
Carlos Coolidge,	1848. - - - -	-

## INDEX TO THE ILLUSTRATIONS.

Fig.	Page.	Fig.	Page.	Fig.	Page.
1 Dip of Rocks,	216	16 Maclurea,	62	40 Chittenden County,	155
2 { Synclinal and }	17	17 Sec. of S. mountain,	63	41 Sanguinolaria fusca,	159
3 } Anticlinal axes, }	19	18 Rocking Stones,	75	42 Saxacava rugosa,	159
4 Unconformable Stra.	19	19 Greenstone Dikes,	76	43 Burlington,	162
5 Dikes,	21	20 Porph'y and Green's	77	44 Essex County,	165
6 Mountains,	29	21 State House,	101	45 Franklin County,	169
7 Geological Map,	44	22 Coat of Arms,	103	46 Grand Isle County,	175
8 Paludina,	51	23 Dev. on Bills of Cr.	103	47 Lamoille County,	181
9 Planoribis,	51	24-32 Indian Relics,	107-110	48 Orange County,	187
10 Cyclas,	51	33 Vt. University,	122	49 Orleans County,	192
11 Trilobite,	58	34 Addison County,	135	50 Rutland County,	199
12 Graptolite	60	35 Geological Section,	137	51 Wash'gton County,	204
13 Orthia,	61	36 Oven. Monkton,	138	52 Windham County,	210
14 Columnaria,	62	37 Bennington County,	143	53 Bridgeman's Fort,	213
15 Orthocera,	62	38 Caledonia,	119	54 Windsor County,	215





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